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OBSTETRICS.

CAZEAUX AND TARNIER.

EIGHTH AMERICAN EDITION.

WITH APPENDIX BY PAUL F. MUNDÉ, M.D.,
AND NEW ILLUSTRATIONS.

IN TWO VOLUMES.

CAZEAUX AND TARNIER.

THE

THEORY AND PRACTICE

OF

OBSTETRICS;

INCLUDING DISEASES OF PREGNANCY AND PARTURITION, OBSTETRICAL OPERATIONS, ETC.

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WITH CHROMO-LITHOGRAPHS, LITHOGRAPHS AND OTHER FULL-PAGE PLATES, AND ONE HUNDRED ADDITIONAL ILLUSTRATIONS.

VOLUME II.

PHILADELPHIA:

P. BLAKISTON, SON & CO.,

1012 WALNUT STREET.

1886.

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PART V.

OF DYSTOCIA, OR PRETERNATURAL AND PAINFUL LABORS.

ALTHOUGH labor is a natural function, and the resources of the organism are usually sufficient for its accomplishment, yet there are a number of circumstances which may interfere with the work of nature, and render the process difficult, dangerous, or even wholly impossible. It is to the exposition of those difficulties and dangers, and more particularly to the indication of the appropriate measures for preventing or for remedying them, that the fifth part of this work is devoted. In it will be pointed out the difficulties and accidents which may complicate labor and demand the intervention of art.

The causes that render a labor either difficult, impossible, or dangerous, and which therefore require the more or less active interposition of the accoucheur, are numerous, varied, and far from always having the same mode of action; some, indeed, operate only by enfeebling or reducing the forces necessary for the expulsion of the child, while others constitute an obstacle to its delivery by occasioning a disproportion between the dimensions of the pelvic canal and those of the body that must traverse it, thus rendering the most powerful contractions of the womb entirely nugatory. On the other hand, when all the conditions are apparently most favorable to a natural labor, we may find a number of accidents suddenly manifesting themselves, of a character dangerous to the lives of both mother and child.

Consequently, as regards the causes that may thus interfere with the regular process of nature, we may distinguish three different groups of difficult labors, namely: 1. Those rendered difficult, impossible, or dangerous, by a deficient or excessive action of the expulsive forces. 2. Those rendered difficult, impossible, or dangerous, by obstacles to the expulsion of the fœtus. 3. Those complicated by accidents liable to endanger the life or health of the mother and child.

The term *accident* is more especially applied to any morbid phenomenon occurring during labor, liable to be rapidly fatal to either mother or child. These accidents, in the above restricted sense, are, fortunately, but few. They are on the part of the mother: 1. Eclampsia. 2. Rupture of the uterus. 3. Hemorrhage in its various forms. On the part of the fœtus, the only accident to be apprehended is prolapsus of the cord or its compression.

CHAPTER I.

OF LABORS RENDERED DIFFICULT, IMPOSSIBLE, OR DANGEROUS, BY DEFICIENCY OR EXCESS OF ACTION IN THE EXPULSIVE FORCES.

In practice, we meet with numerous cases in which the position is favorable, the organs of the mother and child well formed, and in which none of those grave complications, hereafter spoken of, that have given rise to the title *preternatural labor*, are met with; but in which, notwithstanding, the different stages of the labor are not accomplished with the customary ease or regularity. Now, everything seems so admirably arranged in the works of nature, that the least deviation is sufficient to interfere with their accomplishment; and whether this deviation be dependent on an unusual slowness or an excessive rapidity in the course of the phenomena of parturition, it may prove detrimental, in either case, to the mother or her child, and require the intervention of art just as imperiously as would a hemorrhage or a contraction of the pelvis. We therefore believe it will prove serviceable to treat, with a little more detail than has hitherto been done, of the causes and proper measures for preventing the disastrous consequences of extreme slowness or a too rapid progress of the labor.

ARTICLE I.

OF EXTREME SLOWNESS OF THE LABOR.

Whilst stating (page 297) the usual duration of labor, we were careful to remark that it was often prolonged beyond the fixed period, and that a duration of eighteen or twenty hours, in primiparæ especially, could not be regarded as an alarming circumstance; but that, in all cases, where more than twenty-four hours have elapsed from the time of its commencement, serious accidents might result therefrom, either to the mother or the child, which should always be prevented by removing immediately the cause of this excessive slowness.

In natural labor, the phenomena occur with such a marked degree of regularity that, as regards the duration, the period of dilatation of the cervix is to that of the expulsion as two or three to one; though it is proper to state that the delay may be manifested during either the first or the second stage, and then, of course, this proportion no longer exists. This distinction, which might serve to establish a classification of the causes that retard the labor, if, indeed, they do not make their influences felt in all stages, merits a particular attention with regard to the prognosis; for, although the first stage may be prolonged without danger, the second, on the contrary, cannot pass beyond certain limits without greatly endangering the health of the patient, and oftentimes the life of her child. It is found that the latter is lost at least one time in four, when the head remains in the excavation longer than seven or eight hours after the complete dilatation of the os uteri, and the rupture of the bag of waters, whilst it nearly always survives when the

first period is prolonged even to forty, fifty, or sixty hours and more.[1] Besides, in the latter case, there are scarcely any symptoms worth mentioning presented by the mother, for the great fatigue caused particularly by the loss of sleep, and in nervous women, a considerable irritation, depression of spirits, and alarm, are about the only inconveniences that result from it; since the contraction, although feeble, returns at regular intervals, and the labor makes some progress, notwithstanding it is slow. But when the period of expulsion is extended beyond ten or twelve hours, the pain, as a general rule, is found to become irregular, both in its returns and intensity; and, although it be sometimes more severe and frequent, it is in reality less efficacious, to such an extent, indeed, that the fœtus really seems to be retrograding instead of advancing; in a word, there are uterine pains, but no expulsive contraction.

The local disorder is accompanied, or at least is soon followed, by a violent trembling; the patient has an inclination to vomit, and even throws up bilious matters; she is uneasy, excited, and changes her position every moment; the skin is hot and dry; the pulse runs up to a hundred or a hundred and fifty per minute; the tongue is dry, and both it and the teeth are covered with a dark coating. The vagina and cervix are hot, and sensitive to the touch, and a yellowish liquid escapes from them, which occasionally has a fetid odor; the pressure of the child's head on the neck of the bladder prevents the emission of urine; and the parts that line the superior strait and the pelvic excavation, being compressed for a long time by the head, may become inflamed or even gangrenous; which complications may subsequently prove a source of the most serious accidents.

If the woman still remains undelivered, these symptoms augment in intensity in a frightful manner; the vomitings become more frequent, and the abdomen more distended; the excitability of the patient knows no bounds; the pulse is more and more feeble and frequent, and she falls into a half stupid or a semi-delirious condition, which is soon terminated by death. It is scarcely necessary to remark that, in the latter case, the life of the child is also most seriously compromised.

We have felt bound to point out these differences in the danger of the symptoms, in order to prove the necessity of the distinction we have made; and we may now proceed to study the divers causes which, at times, retard the course of labor, and also to indicate the means calculated to remedy them, without the necessity of repeating in each, that the dangers to which they expose the mother and child are much more grave in the second than the first stage of the labor; and that, although in the latter we may trust longer to the resources of the organism, in the former, the intervention of art is demanded at an earlier period.

The causes that may retard the delivery depend either on the patient's

[1] The following summary, which I take from Churchill, is calculated to confirm the above: in one hundred and thirty-three cases, where the first stage was prolonged from twenty-four to sixty hours, only eight children were lost; in eight that lasted from sixty to a hundred hours, but one died; and in three cases ranging from a hundred to a hundred and seventy-seven hours, not a single death occurred.—*Churchill*, 192.

general condition, or on a special modification of the genital organs; and, in both cases, their influence may be exerted at the commencement, or only at a subsequent period of the labor; consequently, we have to consider the three following conditions: 1, where the pains or contractions are slow or feeble in the commencement; 2, where, after having set in with considerable energy, they afterwards relax, diminish, or even cease altogether; and 3, where they exhibit great irregularity in their duration, intensity, and returns; an irregularity that almost wholly destroys their expulsive action. The English writers have applied the term *tedious labor* to all these varieties, and this appellation merits our adoption, for it is perfectly adapted to the cases we are about to describe.

§ 1. Of Slowness or Feebleness of the Contractions.

A *slowness or feebleness of the contractions* may occur at the very commencement of the labor, and persist throughout its whole duration; the pains are quite feeble, the dilatation of the os uteri is effected very slowly, and at a rather later period they seem unable to effect the expulsion of the head. This slowness of labor may be dependent either on the woman's general condition, or on a local disposition of the womb. In the former case, it occurs in women endowed with a delicate or debilitated constitution, or in those accidentally enfeebled by chronic diseases.

It should, however, be borne in mind that, as was stated, page 150, general debility of the muscular system has but little influence upon the contractile power of the uterus, the latter being often very strong, as in consumptive patients for example. The labor sometimes progresses even more rapidly than usual in such individuals, for when the uterine fibre preserves its contractile powers, the slight resistance at the floor of the pelvis seems to expedite the delivery.

Generally speaking, there is nothing to be done but to encourage the woman to have patience, and to make use of some slight stimulus, such as broth, claret, or a few spoonfuls of sherry-wine; in a word, to sustain her strength as much as possible, resorting to the ergot, or preferably to the forceps, as soon as the cervix is sufficiently dilated, if the uterine contraction is too feeble to effect the engagement and subsequent expulsion of the head.

But where the slowness of the labor is to be wholly attributed to a local condition of the womb, the determining causes ought to be carefully sought after, as they are variable, and require the employment of different means; and hence we learn the importance of a correct diagnosis.

a. An excessive distention of the uterine walls, whether dependent on dropsy of the amnios or on the presence of several children in the womb, should be placed in the first rank of these causes. In fact, this overdistention renders the uterine walls much thinner than usual, benumbs them in some measure, and diminishes their force of contraction. Independently of a considerable enlargement of the belly, and the unusual elevation of the head towards the end of gestation or beginning of labor, which is worthy of attention, there is something then altogether peculiar in the character of the pains. The contractions, though feeble and only returning at distant and irregular intervals, reduce the patient to a state of anxiety

and continual suffering; and, if we may judge from her expression, seem to implicate the fundus alone, without extending lower down, for the amniotic pouch, if still unruptured, scarcely bulges out during their continuance. Under such circumstances, we should carefully avoid resorting to stimulants, which would have no other effect than to augment her sufferings, without rendering the contractions any more energetic. The rupture of the membranes is here the only remedy, because, by facilitating the discharge of the waters, we relieve the excessive distention of the organ, as well as the continual distress thereby occasioned, and then the genuine pains become more frequent and more effectual.

B. The slowness and feebleness of the contractions may likewise depend on a sanguineous engorgement, or plethora, of the uterine tissue. This condition, when it exists, can be recognized by the following signs: the pains are at first quite energetic, but soon diminish, both in frequency and intensity; the cervix uteri is soft, supple, and non-resistant, but the presenting part does not engage during the pain, which latter is equally diffused over the whole abdomen; the phenomena of general plethora nearly always manifest themselves at the same time; thus, the respiration is laborious, the pulse hard and full, and the pains very irregular, both in force and frequency. Bleeding in the arm, proportioned to the general condition of the patient, is then the best remedy.

C. Or it may be owing to a debility, or an imperfect organization of the uterus itself, though the patient may otherwise be perfectly healthy, that is, the muscular apparatus of the womb may be deficient in contractile force, while the other muscles of the organism are endowed with their usual energy. The dilatation of the os uteri is effected slowly, for notwithstanding the cervix no longer offers any resistance, the organ appears incapable of determining the expulsion of the foreign body it encloses. In such cases, the ergoted rye is the only article capable of stimulating the enfeebled contractions. The most certain procedure would be to apply the forceps, provided the dilatation be sufficient to permit it.

Dr. Franck, of Wolfenbutten, has recently recommended the employment of electro-magnetism in cases marked by weakness or absence of the contractions, giving four observations, in which, he states, it was used with advantage.

Quinine has recently received the attention of obstetricians as being of especial value to promote the tonic contraction of the uterus.

According to the observation of Dr. Albert H. Smith, "even where there is no decided inertia at the onset of labor, there may be failure of the powers of the mother from early exhaustion and fatigue, and we get the benefit of the quinia in diminishing this tendency, and also in promoting the condensation of the uterine fiber after the delivery of the placenta." He gives the bisulphate of quinia in one dose of 15 grains.

D. According to Baudelocque, the death of the child would have the unfavorable effect of diminishing and enfeebling the uterine contractions; but M. P. Dubois remarks, and very justly, in our opinion, that, if the woman is otherwise healthy, this event has no influence over the progress of her labor; and that, if it sometimes happens that the delivery is more painfully

accomplished where the infant has been dead for some time, it is only because the disease of the mother has been the occasion of its death, and that her forces are weakened by the antecedent malady.

E. Finally, a premature rupture of the membranes may have the same effect, in relaxing and weakening the pains, as their more retarded rupture; and the following phenomena may then take place: if the head happens to be very large, and is low down when this occurs, it becomes applied directly to the orifice, and retains a great part of the waters behind it, and if the os uteri is sufficiently dilated to permit the head to engage freely, no water escapes, even during the contraction; but if the dilatation is still imperfect, the waters leak away drop by drop, it is said, at the commencement and termination of each pain, which latter is wholly employed in thus gradually expelling the amniotic liquid, without contributing in any wise to the enlargement of the cervix. The same phenomenon is observed when the membranes yield at a higher point of the pouch, one not corresponding at all to the neck of the uterus, for in such cases but little water escapes at the moment of the rupture, and each pain is likewise accompanied or followed by a greater discharge without accelerating the dilatation in the least. However, this circumstance, according to M. P. Dubois, does not merit all the importance usually ascribed to it, since, properly speaking, the expulsive process has not commenced, and the fœtus, protected by the surrounding liquid, cannot suffer in any wise from the slowness of the labor, and therefore, in most cases of this kind, there is nothing to be done. If, however, the labor lingers too long, we might follow the plan generally advised and introduce two fingers into the cervix uteri, and push up the child's head, for the purpose of promoting a more ready escape of the waters, or, indeed, of lacerating the inferior segment of the membranes, if the original rupture had occurred at a much higher point. Nevertheless, this manœuvre is only to be resorted to when the dilatation is already well advanced, for it is evident that, if all the waters should escape a long time before the enlargement of the neck, the infant might suffer from the prolonged and direct compression of its body.

§ 2. Relaxation or Suspension of the Pains.

It is not at all unusual to find a labor which has heretofore been progressing favorably to become at once arrested, and the pains, which up to that time were strong and frequent, to relax or even disappear altogether. Of course, the indications which these phenomena present will necessarily vary with the causes that have given rise to them, and therefore the physician ought to search them out with the greatest possible care. Among those which may thus diminish or suspend the pains, the following are usually enumerated, namely:

A. Any vivid moral impressions operating during the labor, any unexpected news or sharp discussions, the announcement of a child of an unwished for sex, and the arrival or presence of persons disagreeable to the lying-in woman, may determine a cessation of the pains; and in these cases the removal of the cause is the only remedy. But, unfortunately, it is not always an easy matter to ascertain what that cause may be, and it is left to

the prudence and sagacity of the medical attendant to penetrate the mystery and relieve the trouble.

B. A pain caused by the coincidence of some malady, either existing antecedent to, or appearing during the labor, such as distressing and repeated vomitings, sharp pains in the muscles of the back and abdomen, gripings in the intestines, &c., &c. In all such instances, the woman, experiencing an intense pain, which is further heightened by the uterine contraction, endeavors to suspend the latter as much as possible, and hence the accoucheur should try to remove the cause which thus interferes with the labor. For instance, where the emesis obstinately persists, he ought, if the patient bears opiates well, to administer a few drops of laudanum, and if not, some aromatic drinks or antispasmodics, accompanied by narcotic lotions over the epigastrium. In case of acute muscular pains, embrocations with an opiated liniment might be practised over the affected part, or a change of position is sometimes all that is requisite to calm them. If, however, as often happens, this pain, which is wholly foreign to the uterine contraction, cannot be relieved, then the powers of nature must be assisted by an artificial termination of the labor.

Those violent cramps, which are occasionally produced by the pressure of the child's head on the sacral nerves, should certainly be classed among the circumstances that may relax or even suspend the uterine contraction altogether; as occurred in three cases of the kind observed by Prof. Meigs, of Philadelphia, where the pain was so violent that it caused the patient the most inexpressible anguish. The women describe this pain as similar to what would be produced by the pinching or twisting of a large nervous trunk; they incessantly demand a prompt deliverance, and the physician is often obliged to yield to their entreaties; besides, his intervention may be further necessitated by the more or less perfect suspension of the contractions of the womb; for the organ seems paralyzed by the violence of these nervous pains, and we are often constrained to apply the forceps for the double purpose of relieving the patient from the frightful sufferings that torment her, and of supplying the want of power in the uterine efforts.

The use of chloroform might, in all these cases, have a happy effect by paralyzing the animal sensibility and thus allowing the uterus to resume its functions. The English accoucheurs have often used it successfully in this way.

C. We have already alluded (page 393) to the unfavorable influence that a distended bladder might have over the progress of parturition; and therefore, if the suspension of the pains could be justly attributed to this circumstance, the catheter should evidently be resorted to at once; but if this operation is rendered impossible by the engagement of the head in the excavation, recourse should be had to the application of the forceps; for the administration of ergot here would appear to be very imprudent, to say the least.

D. If caused by general plethora, which is characterized and is easily recognizable by redness of the face, headache, throbbings in the head, vertigo, dimness of vision, tinnitus aurium, agitation, unusual force and fulness of the pulse, and by weariness of the limbs, it must be relieved by general venesection.

E. Debility of the uterus itself is also mentioned as a cause, since there are some women in whom the contractile force of this organ is so easily exhausted that the contractions, after having proved quite sufficient for the earlier steps of the labor, diminish, or disappear all at once, without any other appreciable cause than this feebleness of the organ. In such cases, the patient should be advised to rise up and walk about the chamber for some time, and it is also necessary to rub her abdomen, to titillate the cervix uteri, and to make pressure on the perineum; and then, if all these means fail, to administer the ergot or uterine douches, and finally apply the forceps if necessary.

§ 3. Irregularity of the Pains.

The contractions may be irregular in their progress, or they may be partial in their operation: that is, only one portion of the uterine walls contracts, the rest of the organ remaining in a state of inaction; which irregularity is sufficiently explained by the muscular structure of the womb. In the first variety, the pains are recognized by the following signs: there is not a complete and perfect interval between them, they are continuous, and only interrupted by the paroxysms, during which the intensity of suffering is horrible. In the second variety, the pain returns, it is true, at intervals, but sometimes it is only the fundus, again one of the angles, and at others, some part of the body, which contracts spasmodically, whilst the remainder scarcely does so at all. The pains are, however, no less acute than if the whole organ were involved; often, indeed, they are more so, though even then they are easily recognized by the fact of occurring almost without effect, or at least without having a decided influence upon the progress of the labor. For during the pain, and even at the very moment when the woman suffers the most, we may ascertain, by applying the hand on the hypogastrium, in the case of partial contraction, that the uterine ovoid does not present its normal regularity, and that it exhibits instead various bosses and inequalities; besides, we can readily assure ourselves, in all cases, that no impulsion is given to the fœtus, and that the presenting part does not advance; as, also, that where the membranes are still unruptured they do not bulge out, nor indeed scarcely become tense during the pain. At the height of the latter, just at the moment of the paroxysm, the presenting part seems, at times, to advance a little; but this progression does not correspond, on the one hand, with the violence of the pains, and, on the other, it is not kept up, though the pains continue. The patient is then suffering from an extreme agitation, she weeps and becomes despondent, and very often her pulse is frequent, developed, and febrile; the face red and flushed; the skin hot; the mind confused, and the limbs convulsively contracted. These irregular contractions, which have been designated under the title of *uterine tetanus*, sometimes disappear of their own accord, though they may be prolonged for an indefinite length of time. It is then highly important to remedy them as soon as possible, which is best done by a general bleeding where the woman is plethoric, the pulse full and well developed, and the face red and flushed; but as this is not practicable in nervous and very irritable women, we should then resort to tepid baths, emollient injections,

and opiated lotions over the abdomen, and more especially to laudanum, given once or twice as an injection, in the dose of twenty to forty drops, diffused in three or four ounces of some mild vehicle.

Under the influence of these measures, the last particularly, the pains almost entirely disappear in the course of half an hour or an hour; during which period the patient generally slumbers, and then the good pains, that is the natural and regular ones, come on, and the labor terminates happily

The action of opiates is occasionally much more prompt, being felt in the course of ten minutes or a quarter of an hour after their administration. I witnessed this fact in a young primiparous lady, whose labor commenced at ten o'clock in the morning, and the pains progressed slowly but regularly until four the next morning, when they assumed the peculiar character under consideration; and from that moment, notwithstanding the almost continuous suffering and permanent contraction of the womb, the head did not descend. At six, I administered opiates; and in the course of ten minutes, the excessive agitation was calmed, the pains disappeared entirely, then returned again a few minutes after, at first slow and feeble, but soon regular and energetic enough to effect the delivery in a short time. When the cervix participates in this state of spasm, the employment of the ointment and extract of belladonna, as we shall have occasion hereafter to point out, will be found decidedly useful; though we ought to mention that the employment of belladonna has been objected to on the ground that it suspends the pains, and paralyzes the exercise of the contractility of tissue after the labor is over; but this is an error, for its action is always limited to the neck, and the latter, at most, may be paralyzed for some time.

It is a difficult matter to apply the ointment to the cervix, and is by many accoucheurs deemed useless. Morphia has a quieting and restorative action upon the spinal nerves, which are supposed to exercise an inhibitory influence upon the uterus, and should be given in full doses.

It appears to me that inhalation of anæsthetic agents might be used with advantage in all these cases of partial or irregular contractions. They would seem adapted to calm the over-excitement of the uterus with which the pains are generally associated. In several cases they acted like opium, by suspending the contractions for the moment, and then enabling them to resume their normal regularity and efficiency.

§ 4. Effect of Contraction of the Abdominal Muscles.

The second stage of labor is sometimes exceedingly slow in very fat women; in whom the contractions do not cease altogether, but appear to be ineffectual, and do not force the child's head to advance; this impotence of the uterine efforts has appeared to me to be much less dependent on resistances from the lower part of the pelvic canal, than on a default of action in the abdominal muscles; because the thick layer of fat, which lines the anterior walls of the belly, must paralyze, to a certain extent, the synergic action of those muscles, and thus deprive the uterus of the aid which they habitually render. The abdominal compression, which is so much extolled as a remedy, would then appear peculiarly applicable; for a circular bandage, applied around the body, would effectually replace the *point d'appui*, which the contracted muscles usually furnish to the womb; besides, as Vel-

peau observes, this is too innocent a remedy not to be employed before having recourse to ergot, or to an artificial termination of the labor.

[Admitting that contraction of the uterus is the principal efficient cause of delivery, a fact proved by vivisections practised upon animals and pathological cases occurring in women, it is nevertheless true that the contraction of the abdominal muscles and the exertions of the female assist powerfully in the expulsion of the fœtus. Some cases would even seem to show that paralysis of the abdominal muscles, making a strong voluntary effort impossible, has sometimes delayed delivery very considerably.

A paraplegic woman attended by M. Depaul had to be delivered by the forceps on account of the slow progress of the labor. In her case, the uterus contracted regularly, and there was no obstacle to the expulsion of the fœtus. M. Depaul was sure that the extreme slowness was due to the paraplegia. I have myself met with a similar case in a multipara whose labors before becoming paraplegic had always been easy. Notwithstanding the paralysis, she became pregnant; but this time, although the uterine contractions were rapid and powerful, it was necessary to deliver her by the forceps.

The unfortunate effect of an impossibility of making sustained efforts from other causes is shown by a case of a different character witnessed by M. Depaul. A young lady whose thigh had been amputated became pregnant, and during labor was, consequently, able to take the usual fixed support with but a single foot. The consequence was, that the necessarily badly directed exertions which she made seemed to weaken the uterine contractions. The pelvis was well formed, and there was nothing to obstruct the passage of the fœtus, yet it became necessary to apply the forceps and deliver her.

To the cases just related, some of a directly opposite character may be produced; and I have myself seen delivery accomplished in a paraplegic woman with the greatest facility. The difference is due to the fact that cases are subject to infinite variety; pathological phenomena, instead of appearing separately, are associated in a thousand different ways; so that in one woman the uterine contractions alone are sufficient to expel the fœtus, whilst in another they require to be assisted by the contraction of the abdominal muscles.]

ARTICLE II.

OF TOO RAPID LABORS.

Although these are much more rare than the preceding class, yet the accidents that may result in consequence of too prompt a delivery, are quite as serious as those produced by excessive slowness; and, therefore, we must endeavor to supply an important omission made by most authors, and ourselves likewise in the first edition of this work, by devoting a few lines to the consideration of the attendant circumstances.

Some women have the unfortunate privilege, if it can be called such, of being delivered with only a few pains; and this extreme rapidity is apt to characterize every subsequent labor. What is still more singular, this peculiarity even seems to be hereditary in certain families, in which it is perpetuated for three or four generations.

In such cases, the rapid termination is always to be attributed either to an excess of energy and frequency in the uterine contractions, or to a want of resistance in the walls of the canal which the fœtus has to traverse.

Certain writers have attempted to establish a relation between the phenomena that precede or accompany the menstrual discharge in the non-gravid state, and the activity or slowness of the contractions of the womb during the labor; for they say, should the periodical flow be difficult, laborious, and painful, and the patient be tormented every month with violent colicky pains, either before or during her terms, the irritability of the uterus, and the energy of the contractions, will almost invariably be excessive in the hour of childbirth; but, on the contrary, there is reason to anticipate the occurrence of slow and feeble pains, where the woman is advised of the return of her menses only by the appearance of blood, and when they pass off without suffering. We do not know exactly to what extent this approximation is true; yet we believe that it is far from being without exceptions. But, however this may be, it is generally found that these very powerful contractions are most likely to be observed in nervous and excitable persons; appearing to depend, says Wigand, upon a high grade of irritability, the source of which, especially in hysterical patients, seems to be centred in the uterus. The moral affections are often found to have a great influence over the progress of labor; and everybody knows that where an application of the forceps has been seriously proposed to the woman, this of itself has often proved quite sufficient to bring on strong and powerful contractions of the womb, by the fears which the instrument gives rise to, even though they had been languishing before.

In certain eruptive fevers, scarlatina especially, the pains very frequently exhibit this character, and the child is then expelled with an unusual rapidity; but it is difficult to decide whether this circumstance is not rather owing to a want of resistance from the soft parts, which, like all the muscular apparatus, have been enfeebled by the disease.

The same thing also occurs in certain strong, robust, and plethoric women; here, however, the contractions are very strong from the commencement of labor; they are very painful, last for a long time, and are separated by short intervals. While the pain lasts, the patient cannot resist the urgent desire to bear down, and forcibly contract all the muscles of her body; she is much more irritable than usual, and there is something peculiar in her attitude; the head is hot; the face red and puffed up; and the pulse full and accelerated. In some instances, the intervals are scarcely perceptible, for one pain has hardly terminated before another begins; sometimes, indeed, the womb seems in a state of permanent contraction, which only passes off after the expulsion of the fœtus. The belly is then very hard; the whole body rigid and contracted; the woman holds her breath, seizes hold of some neighboring object, and, making a loud cry, or grinding her teeth, bears down with incredible force, and suddenly expels the child, together with the contents of the bladder and rectum.

But, after all, however forcible we may suppose the uterine contractions to be, they will hardly explain the rapidity of the delivery, unless we admit that a want of resistance in the walls of the pelvic canal exists at the same time; but may not a very large pelvis, a premature child, or a marked diminution of the normal resistance of the soft parts, so often met with in

persons worn out by lingering diseases,[1] — may they not, we repeat, be considered as singularly favoring a too early expulsion of the child?

Where the phenomena of parturition take place with due regularity, the infant rarely comes into the world under seven or eight hours after the first pain, and this beneficent delay enables the parts which the child has to traverse to become prepared for the dilatation they must shortly undergo; the uterine orifice gradually enlarges; the soft parts, that line the excavation and the pelvic floor, being lubricated for a long time by the liquids exhaled from the womb, or secreted by the upper part of the vagina, become more soft and supple and better prepared for the distention they will be subjected to at the moment when the head is born; besides, their dilatation being effected under the influence of intermittent contractions, alternated by an interval of rest, is slow and gradual, and takes place without causing the patient any very acute suffering and without compromising the life of the child; but it is far different in the case before us, where the overhasty expulsion of the infant exposes it as well as the mother to grave accidents. Thus, not to speak of inertia of the organ, which will be treated of hereafter as one of the circumstances that may complicate the delivery, we must note as of possible occurrence the laceration of the perineum, vagina, and vaginal portion of the cervix, so often produced by the rapid passage of the fœtus through the pelvic canal; the prolapsus of the womb, which, not being yet sufficiently dilated to allow the child to clear its orifice, is forced down beyond the vulvar ring; the serious and sometimes fatal syncopes to which the too rapid depletion of the womb exposes the patient;[2] and, lastly, death itself, produced solely from the violence of the nervous shock caused by such pains.

The child is likewise exposed to real danger; for if the membranes are ruptured and the waters entirely discharged early in the labor, it must be apparent that, when the pains become permanent, the umbilical cord might be compressed between the fœtal surface and the uterine wall, or that the infant itself might suffer from the direct pressure it then undergoes. On the other hand, if the woman, supposing herself only at the commencement of her labor, should happen to be still standing or walking when surprised by these violent pains, the child may be forcibly expelled, and, striking against the floor, be killed, perhaps, by the severity of the fall; besides

[1] This want of resistance from the soft parts may be met with in women who are otherwise healthy, as occurred in a case reported by Dr. Rigby, where a patient, in the enjoyment of good health, was delivered by two pains; the first of which aroused her from a sound sleep, and the second expelled the child into the bed.

[2] There is no difficulty in explaining the production of syncope in this case, for the womb, being distended by the product of conception, necessarily exercises a greater or less degree of compression on the large abdominal vessels; and when the fœtus is slowly delivered, as in a natural labor, this compression diminishes in the same proportion, and the blood returns in a very gradual manner into the great trunks, in which its course was before impeded; but in the case before us the depletion of the uterus is sudden, and the vessels are relieved all at once from the strong pressure they previously experienced, the blood flows into them in abundance, and goes in but small quantities to the brain: whence the latter, deprived of its natural stimulus, no longer acts on the heart, &c., &c.

which, the umbilical cord is stretched from its placental insertion to the navel, and, if its rupture does not result in consequence, the traction made upon the still adherent after-birth may be sufficiently great to depress, or even to invert the womb completely; though this latter circumstance is an exceedingly rare one. A rupture of the cord has been observed much oftener; but this is seldom attended with much danger, so far as the child is concerned, because the laceration usually occurs at two or three inches from the navel, and because, by tearing the umbilical vessels, it is likely to prevent a mortal hemorrhage, even should the pulmonary respiration not be established immediately.

Treatment.— Where there is reason to believe that the child is very small, as it would be in a case of premature labor, or if previous deliveries had led us to suppose that the pelvis is larger than usual, the woman ought to lie down on the occurrence of the very first pain, and she should avoid bearing down or contracting the muscles subjected to the influence of her will, as much as possible, during the pain; the same object would be materially aided by applying a moderately drawn bandage around the abdomen (Rigby). Finally, every precaution is to be taken to retard the rupture of the membranes as long as possible.

If, notwithstanding these precautions, it is found that the inferior part of the uterus is strongly pressed downward towards the floor of the pelvis, or even through the vulvar orifice, it must be carefully sustained until the cervix is sufficiently dilated to permit the free passage of the head. We might, like M. Nægèle, apply a large T bandage in front of the vulva, extending up over the prominent part of the womb, and having an opening at its centre corresponding to the orifice of the vagina.

If the patient had been delivered too rapidly in her previous pregnancies, opiates might be administered, either by the mouth, or by injection, for the purpose of calming the excessive irritability of the uterus. Wigand recommended venesection, which, perhaps, might be employed with advantage in strong and plethoric women, but experience has not yet determined the efficacy of the measure as a general remedy.

CHAPTER II.

OF DEFORMITIES OF THE PELVIS.

The material obstacles which too often render spontaneous labor difficult or impossible, are exceedingly numerous, and depend either on the mother or child. The diseases and deformities, or faulty direction of the canal which the fœtus has to traverse, are naturally included among the first; and to the second we must refer the diseases and malformations of the infant itself, as also the unfavorable positions in which it may present at the superior opening of the pelvis. We shall commence our description with the obstacles appertaining to the mother's organs, and will first treat of deformities of the pelvis.

Whenever the pelvis departs from the dimensions heretofore described as the normal ones, it is said to be deformed; which, as the reader will readily understand, may imply either an enlargement or a diminution of the average size; and this explains the division, admitted by accoucheurs, into pelves deformed by excess of amplitude, and those deformed by excess of retraction. I say by *excess* of amplitude or of retraction, for it must not be supposed that a pelvis is reputed to be malformed, whenever it does not exactly present the dimensions before given as the ordinary standard; because its development is subjected to the influence of the same laws that regulate the whole organism, and we all know what great varieties those laws exhibit in their accomplishment. Therefore, as a few lines, more or less, do not constitute a deformity, we shall only include under the title of malformed pelves those which, from their excessive size or narrowness, are capable of producing notable difficulties in the exercise of the puerperal functions.

§ 1. Of the Pelvis Deformed by Excess of Amplitude.

A large pelvis is not always a favorable circumstance, as might at first sight be supposed; because, if the amplitude is too great, it exposes the woman to serious accident, both in the non-gravid, the pregnant, and the parturient state. Thus, in the unimpregnated condition, the uterus, not deriving an adequate support from the walls of the excavation, and being free and movable in an overspacious cavity, is much more liable to the various displacements known as descent, anteversion, and retroversion of the womb; which accidents are then the more unfortunate, as they are the more difficult to remedy.

During gestation, the womb, finding more space than usual in the pelvic cavity, remains there until a much more advanced period of pregnancy, and the volume of the organ, by compressing the rectum and the bladder, often occasions an excessive tenesmus in these parts, which proves very distressing to the patient; sometimes, even the discharge of the urine and fecal matters is impeded, besides which, varices, hemorrhoidal tumors, or a considerable infiltration of the lower parts, are found to be developed, in consequence of the mechanical obstacle to the circulation in the inferior extremities. If this excess of amplitude is restricted to the excavation, while the straits vary but little, if any, from their normal dimensions, the fundus of the womb is often turned back into the hollow of the sacrum; and, somewhat later, when its volume is too great to permit a longer sojourn in the lesser pelvis, it meets with difficulties at the superior strait which it cannot surmount; and the impediment then offered, in either case, to the ulterior development of the organ, frequently brings on an abortion. At the end of gestation, the head engaging early at the superior strait, gets low down into the excavation, and presses on the neighboring parts; whence all the unpleasant symptoms that had accompanied the outset of pregnancy are found to be renewed in its latter months.

During labor, the excess of amplitude of the pelvis exposes the woman to all the dangers that may result from a too rapid delivery; for, if she brings into play the voluntary muscles, long before the proper dilatation of the os uteri, or bears down too strongly during the pain, the organ, being

imperfectly sustained by the osseous walls of the canal, may be forced down as far as the vulva; and, indeed, be driven completely beyond the parts of generation; or, possibly, the circumference of the cervix uteri may yield and thus give rise to a laceration. Supposing the dilatation is already perfected, then the child, being urged along by the energetic and repeated contractions of the womb, and not encountering a due degree of resistance on the part of the straits, speedily reaches the perineum, and tears its way through, because the latter has not yet had time to become distended. The expulsion of the fœtus may thus take place at a moment when the patient and her attendants believed it still distant; and hence, the absence of the ordinary precautions, and the erect position in which she may happen to be, will expose the child to a fall on the floor, or produce a premature separation of the placenta, a rupture of the umbilical cord, or an inversion of the womb; and, last of all, the womb, from being suddenly emptied, is sometimes affected with inertia, and becomes the source of a profuse flooding.

After delivery, a very large pelvis permits the uterus, notwithstanding its volume, to sink down into the excavation, and the compression thereby produced on the adjacent organs may become the cause of an inflammation that is always to be dreaded. It is further evident that an excess of amplitude must favor the displacement of the organ; and it is highly probable that the cases of retroversion reported by Martin, of Lyons, and Vermandois, as having occurred in the first few days immediately following the delivery, were owing to this circumstance. (*Martin*, 158.)

The indications for treatment, which malformation of the pelvis, from excess of amplitude, present, are exceedingly simple; for all that we have to do is to keep the patient recumbent throughout the labor, and recommend her not to aid the pains in any wise, and particularly not to bear down until the os uteri is fully dilated. Where this process is not yet completed, and the cervix, pressed down by the head, appears at the vulva, we must endeavor to push it back during the interval, and then, by supporting it with the hand, oppose its escape during the contraction.

For the indications to be fulfilled during the progress of gestation, we refer to the pages in which are studied the rational signs of deformities of the pelvis, and the indications presented by displacements of the uterus during labor.

§ 2. Of the Pelvis Deformed by Excess of Retraction.

Among the various conditions necessary to a spontaneous labor, there is one whose importance cannot be contested, namely, that a just proportion exist between the dimensions of the canal, and those of the body that must traverse it; for whenever this relation does not appear, whether owing to a retraction of the pelvis or to an abnormal size of the child, the delivery is no longer possible; and whenever this disproportion is carried to an extreme, we have only to choose between two resources that are equally disastrous in their consequences, that is, to diminish the volume of the infant, or to enlarge the way it has to pass through. The retractions of the pelvis, therefore, are the most terrible accidents that can occur in the practice of our art, and their importance, in every point of view, sufficiently warrants the detail into which we are about to enter.

The various degrees of retraction, the differences in their seat, and the varieties of form the pelvis then assumes, are so numerous, that it is indispensably necessary to adopt some general arrangement; to collect them into classes, to form groups, and then to attach these to certain principal types that are easily recognized; the number of which, however, to aid their acquisition by students, should not be too great. After having thus classified the different varieties of deformities from retraction, we must study their principal characters, and endeavor to point out their causes, their mode of development, the means of recognizing them, and, lastly, the indications for treatment that each of them presents.

ARTICLE I.

PATHOLOGICAL ANATOMY.

As regards their form and external configuration, the retracted pelves may be divided into two very distinct groups; for either the pelvis, although greatly retracted in all its dimensions, is properly formed, and presents no irregularity in its exterior aspect, or else the retraction affects only one or more of its diameters (the others maintaining very nearly their normal length), and this partial alteration completely changes its form.

§ 1. Of the Simple Contracted Pelvis, without Curvature or Malformation of the Bones. (Absolute Contraction.— *Velpeau.*)

Before the researches of Professor Nægèle, whose principal works on the pelvis will soon be disseminated throughout France, by means of the translation just published by M. Danyau, there was scarcely any mention made of this variety of contraction in the leading classic works; for most of the French and English authors merely stated that narrowness is rarely met with in all parts of the pelvis at one and the same time, and that it is still more rarely carried to a point demanding the intervention of art.

It was reserved for M. Nægèle to point out the importance of this particular variety. In his collection, he numbers four pelves that are contracted throughout, and all their diameters are one inch less than the normal dimensions; these all required either the Cæsarean operation or the mutilation of the fœtus. Three of them were obtained from women of ordinary stature, the fourth belonged to a dwarf thirty-one years of age, and only forty-six inches in height, though otherwise well formed. As regards the respective lengths of their different diameters, and the form of the pubic arch, each one of these presents the characters of a regularly-formed pelvis, whose dimensions may be supposed to have been reduced; and, as to the condition of the bones, that is to say, their color, strength, and texture there is no departure from the healthy standard. In one of them there is even a tendency to a greater density of the osseous tissue. Further, these pelves have nothing in common with those deformed in consequence of rachitis, as the consistence, density, thickness, and size of the bones, and the regular shape of the pubic arch, sufficiently prove; besides, the individuals from whom they were procured, presented no traces of that affection during life; and the examination of other parts of the skeleton fully confirmed this distinction, which we hope to prove in a still more decisive manner here-

after, when the causes and particular development of this species of contraction shall be studied.

M. Nægèle admits two distinct varieties in the malformed pelvis under consideration. In one, he says, the pelvis, with respect to its thickness, strength, texture, and indeed all the physical characters of the bones, size excepted, does not differ from a normal one; and it is met with in persons of either a small, an ordinary, or a high stature, who may be otherwise well formed and thin, and whose external appearance would not cause the least suspicion of such a formation; whence it can only be recognized by a local exploration. In the other, the pelvis is wholly different; for, as regards their volume, substance, and strength, the bones exhibit the characteristics of childhood; and the same remark is applicable to their mode of union with each other. This variety is only observed in very small individuals, such as dwarfs; and the relations of the diameters with one another, and the form of the pubic arch, are such as are found in the girl, when the sexual system has just completed its development. Thus, for example, in the dwarf before cited, whose height was but forty-six inches, the pelvis had the following dimensions, viz.:

From the promontory of the sacrum to the point of the coccyx,	$3\frac{1}{2}$ inches.
The antero-posterior diameter of the superior strait,	$3\frac{1}{8}$ "
Transverse diameter " "	$3\frac{3}{4}$ "
Antero-posterior diameter of the excavation,	$3\frac{1}{2}$ "
Transverse diameter " "	$3\frac{1}{8}$ "
Transverse diameter of the inferior strait,	$3\frac{1}{4}$ "
Depth of the spmphysis pubis,	nearly 1 inch.

§ 2. Of the Pelvis Contracted by the Curvature and Malformation of the Bones. (Relative Contraction.— *Velpeau.*)

In those cases where the pelvis is contracted by the curvature and malformation of its constituent bones, the deformity may be referred to one of the three principal types described by M. Dubois: that is, either to a flattening from before backwards, to a compression on the sides, or to the depression of the anterior and lateral parts; the first variety, or flattening, shortens the antero-posterior diameters, the lateral compression diminishes the transverse ones, and the depression of the antero-lateral walls contracts the oblique diameters. Again, each of these varieties may affect either the superior strait, the inferior strait, or the excavation, though frequently both straits are contracted at the same time.

A. The *flattening from before backwards*, or shortening of the antero-posterior diameter, results from a more or less marked approximation of the anterior and posterior pelvic walls; and this species of malformation exhibits several varieties, as regards the extent of contraction, whether in height or width. For instance, the superior strait alone may be contracted, while the excavation retains its normal capacity; this phenomenon is caused by the unusual curvature of the sacrum, which is sometimes so bent anteriorly as almost to represent an obtuse angle at its middle part, whereby the base of the bone is thrown forward in such a way as to singularly augment the prominence of the sacro-vertebral angle. But the contrary may also occur, and the sacrum, instead of presenting an anterior concavity, be

quite plane, or, occasionally, even convex in front; and then the excavation is contracted simultaneously with the superior strait, in its antero-posterior diameter, and it really seems as if the sacrum, having lost its natural curvature, had been pushed forward in totality.

The shortening of the antero-posterior diameter of the superior strait sometimes accompanies an enlargement of the corresponding one at the inferior strait. This, indeed, is the most frequent arrangement, and is what generally takes place when the sacrum, yielding under the weight of the trunk transmitted to it through the spinal column, becomes tilted, that is, the base is projected forward, while its coccygeal extremity is forcibly pushed backward.

Lastly, the coccy-pubic and the sacro-pubic diameters may be shortened, at the same time, if it should happen that the sacrum, instead of performing the tilting movement just alluded to, yields in such a way that its two extremities are thrown forward; the anterior curvature is then greatly augmented, and consequently the corresponding diameter of the excavation enlarged.

FIG. 93.

A pelvis, in which the contraction of the sacro-pubic diameter is produced by the unusual prominence of the sacro-vertebral angle.

In the approximation of the antero-posterior walls, the sacrum is nearly always the displaced bone; but although much more rare, a flattening of the anterior wall is also met with; and then the symphysis pubis, instead of presenting a convexity in front, is perfectly flat, or even (as in one instance represented by Madame Boivin) presents a depression, which seems to protrude inwardly towards the prominence of the sacrum. This double inclination of the pubis and sacrum towards each other, gives to the superior strait the form of the figure eight; that is, its plane is divided into two rounded portions on the sides, corresponding to the iliac fossæ, and is separated in the middle by a restricted part, of variable width. If the depression is considerable, the antero-posterior diameters of both straits, and of the excavation, must evidently be affected by it.

But there is yet another way in which the symphysis pubis may contribute to the narrowness of the pelvis; for instance, its vertical extent is sometimes much greater than usual, and this extraordinary length gives rise to what is termed the *bar* pelvis; or the same effect may be produced by an excessive inclination backwards at its lower end.

FIG. 94.

One shape of the superior strait in the figure eight pelvis.

Again, the coccy-pubic diameter may

be shortened, it is said, by an elongation, or rather an almost horizontal direction of the coccyx, and more particularly by an immobility of the sacro-coccygeal articulation. This latter circumstance has been invoked in explanation of the slowness and difficulty of first labors in middle-aged women; but, as M. A. Dubois has remarked, the delay in the delivery of the head in such persons does not usually depend on an immobility of the coccyx, but upon the rigidity of the soft parts, which then offer great resistance.

B. The *compression of the lateral walls*, by which the transverse diameter is shortened, is the rarest of all the deformities, at least so far as concerns the superior strait and upper part of the excavation; for the inferior strait, on the contrary, the approximation of the two ischial tuberosities, which constitutes this species of deformity, is quite as frequent as the shortening of the coccy-pubic diameter; the malformation resulting from the approach of those tuberosities, as well as that of the branches of the pubic arch; this latter then assumes the triangular form peculiar to the male sex. Besides which, the lower part of the excavation may be notably diminished in the transverse direction, by the inward projection of the spines of the ischia.

The transverse contraction is seldom as well marked as the flattening from before backwards, especially at the superior strait, where it is, in general, limited to diminishing the bis-iliac diameter from a few lines to an inch in its length, by elongating the antero-posterior one to the same extent; for the coxal bones are then less curved, and the sacrum is thrust backwards, while the pubes are more prolonged in front. Of course, the upper strait will be more or less altered in form according to the degree of compression, for where this is inconsiderable, its periphery is nearly circular; but when greater, it represents an ovoid, the larger extremity of which is posterior.

Another variety of transverse contraction is owing to the fact of the pelvis being less developed in one of its halves than in the other, and consequently to its exhibiting a less degree of curvature in that part than upon the opposite side. In this case, the articulation of the spine with the sacrum no longer corresponds to the middle of the pelvis, and the vertebral column is found nearer to the hip of the contracted side; the transverse diameter is likewise diminished at the inferior strait by reason of the obliquity of the entering part of the coxal bone. The antagonism before alluded to, as existing between the antero-posterior diameters of the superior and the inferior straits, whereby the elongation of one most frequently coincides with a shortening of the other, rarely exists in the transverse direction; the deformity produced by a congenital displacement of the femurs is probably the only condition in which the transverse diameter of the inferior strait augments at the same time that the bis-iliac one diminishes; the enlargement in the lower part of the pelvis, in this instance, being marked by an unusual width in the pubic arch, great obliquity of the ischio-pubic rami, separation of the ischial tuberosities, &c. (See art. *Causes*.)

C. The *depression of the antero-lateral-walls*, which diminishes the oblique diameters, is much more frequent than the preceding variety, though it is more rare than the flattening from before backwards, and it may exist on one or both sides at the same time. This deformity consists, essentially, in

the flattening, or inward projection of the coxal bone, at the part corresponding to the cotyloid cavity, and to the junction of its three constituent pieces; whence there results at this point a greater or less diminution of the curve which the pelvic circumference usually describes; and when existing in a high degree, the curvature is even reversed, its convexity being turned towards the sacrum, while, at the same time, the pubis departs from its normal transverse direction and runs almost directly forwards; so that the deformity is produced by the coxal bones having then assumed the form of an old italic *S*, instead of presenting a regular arch.

Where this takes place to the same extent on both sides, the pelvis maintains a degree of symmetry, and the superior strait is shaped like the trefoil leaf; that is, it presents three lobes, one anteriorly, which corresponds to the more acute angle of the pubis, and two posteriorly and laterally, formed by the union of the iliac bones with the sacrum. But it far oftener happens that the deformity is more marked in the coxal bone of one side than upon the other, and then the shape of the pelvis is the more irregular as the deformity of the ossa innominata is greater.

Where this double disfiguration of the hip-bones exists in a high degree, more especially when it affects the anterior pelvic wall, it vitiates both the oblique and antero-posterior diameters at the same time. In fact, these bones are then approximated in a parallel manner, being only separated from each other by a slight distance, for the extent of an inch or two, while the rest of the pelvis is comparatively regular; and hence, although the symphysis pubis may be at the normal distance from the sacro-vertebral angle, yet it is not the less true that the antero-posterior diameter of the superior strait will be virtually shortened in all its forward part comprised in the fissure left between the two deformed antero-lateral walls, because this contracted portion cannot contribute in any wise to the passage of the fœtal head.

FIG. 95.

A pelvis in which the sinking-in of the antero-lateral walls exists on both sides.

Again, we may remark, with M. P. Dubois, that as the anterior arch of the pelvis has but very little depth at the point corresponding to the depression of its lateral walls, and as the surface compressed by the head of the femur occupies the largest portion of it, the whole of that region must almost necessarily be pressed in; and, consequently, that the shortening must affect all the diameters at once, those of the excavation and of the abdominal and perineal straits; though the retraction is in general less marked at the inferior strait than elsewhere, because the lower part of the ischium is not carried so far backwards as the cotyloid region.

As to the variety of deformity recently described by M. Naegele, the celebrated professor of Heidelberg, under the title of *oblique* contraction,

we may evidently refer it also to a shortening of one of the oblique diameters, and shall describe it hereafter. (See *Causes*).

This remark naturally leads us to the important observation, that hitherto we have considered each of the species of deformity that may alter the various pelvic diameters, as being separate and distinct, since there are some which may exist alone, and only change the corresponding diameters; but, besides the fact that different points of the pelvic circle may be simultaneously deformed, and thus contract the pelvis in several directions at once, the form and extent of the pelvis are such that it is difficult for a flattening, a lateral compression, or a depression of the antero-lateral parts to take place, even separately, without its being thereby contracted in several of its diameters. Let us suppose, for instance, that one of the oblique diameters has been diminished by the depression of the bottom of the acetabulum; and it must be evident that, should the depression be considerable, the body of the ischium cannot be thus thrust inwards and backwards, without drawing along with it at the same time, some considerable portion of the anterior part of the pelvis, and of the arch formed by its lateral half, and consequently without contracting, more or less, certain of the antero-posterior and transverse diameters. Again, where the sacro-vertebral angle, from being projected forward, diminishes the length of the antero-posterior diameter of the superior strait, we have supposed that it followed the sacro-pubic line, in its movement of progression; but, as readily foreseen, it would most often prove otherwise, for the very frequent obliquity in the direction of the forces transmitted through the vertebral column, must compel it to lean towards the right or the left, as well as to the front; whence, the shortening of the antero-posterior diameter necessarily entails that of the sacro-cotyloid interval, and, as a consequence, narrows the whole corresponding half of the pelvis.

Again, the three principal types may be found united in the same pelvis, whereby the latter is greatly deformed in all its diameters. This occurs more particularly in the deformities produced by malacosteon, but it is also sometimes met with, even in a high degree, in cases dependent on rachitis, as fully proved by the facts observed by M. Nægèle.

From all this, we learn what great diversities of shape may be presented by deformed pelves. Madame Lachapelle has gone so far as to designate these varieties by the titles of the *reniform*, the *triangular*, the *bi-lobed*, the *rounded*, the *oval*, the *cordiform*, the *trapezoid*, the *pyramidal*, and the *three-lobed straits;* but she has greatly multiplied the species without any practical utility, and she further admits that there are numerous undescribed varieties for each of these orders.

The Degree of Contraction.—The two extremes of contraction of the straits are from three and three-quarters to four inches for the highest, and from two to three lines for the least, and between these two the pelvis may exhibit all the intermediate degrees of narrowness. The causes which produced the deformity greatly influence the degree of contraction, and in this point of view they may be arranged in the following order, viz., malacosteon, rickets, congenital luxations of the femur, deformities of the spinal column, &c.; we shall take occasion hereafter to revert to the mode in which each of these acts.

Of the Variations in the Depth of the Pelvis.—The vices of conformation, just spoken of, rarely exist without modifying the depth of the pelvis, in a greater or less degree; which circumstance has been particularly dwelt upon by M. Bouvier, in the able work presented by him to the Institute. For instance, the depth may either be augmented or diminished by the variable inclination of the expanded portion of the iliac bones, or of the branches of the pubic arch, as also by the diversities in the length of the sacrum.

Sometimes this latter bone is very short, its contraction being produced either by an excess of the anterior curvature, which brings the two extremities nearer to each other, or by an arrest of development.

Occasionally, the iliac fossæ are elevated, as if they had been forcibly pressed from without inwards, thus giving it the appearance of a male pelvis; and this elevation may be further augmented by exterior and lateral pressure, whereby the bones are rendered quite vertical, and the normal depth of the pelvis is greatly increased. The contrary may occur where the iliac crests, from being strongly depressed and thrust outwards, enlarge the margin of the pelvis, but evidently diminish its height. It would be difficult to misinterpret the influence of the weight of the viscera in such cases when there is no congenital deformity in question. (Bouvier, *op. cit.*)

In conclusion, a widening of the pubic arch must clearly diminish its height to a corresponding extent; while the latter, as well as the whole depth of the pelvis, must be increased, where the ischio-pubic rami are very close together.

ARTICLE II.

OF THE CAUSES AND MODE OF PRODUCTION OF THE PELVIC DEFORMITIES.

For a long time the vices of conformation of the pelvis, as also most of the deformities occurring in the skeleton at large, were attributed to the operation of a single cause, rachitis; but the more careful researches of modern surgeons enable us, at the present day, to ascertain more precisely the effects of rickets on the osseous system, and to appreciate the influence that other general or local diseases may have over the perfect or the defective conformation of the pelvis. And here I must again extract largely from the valuable works of Naegèle, Bouvier, Guerin, Sedillot, and others.

An examination of facts clearly proves that the pelvis may be deformed under circumstances where there has been no rachitis properly so called; and where causes that are purely mechanical in their operation have altered the configuration of its constituent parts at a period when their power of resistance was inconsiderable, not in consequence of any pathological softening, but solely from the tender age of the patient, or the feebleness of its constitution. And hence, as regards the causes that produce the changes in their form, we might classify all the irregular pelves under five principal types, namely:—

1. Deformity from absolute contraction.
2. Deformity from rachitis.
3. Deformity from osteomalacia.
4. Oblique oval pelvis.
5. Deformity consecutive to a previous deformity of some other part of the skeleton.

§ 1. Pelvis Deformed by Absolute Narrowness.

To complete our remarks on the causes of pelvic deformities, we have yet to sum up the various opinions that have been given forth concerning those vitiated by absolute narrowness. According to most authors, the absolute contraction of the pelvis results from an arrest of development, whereby this part still retains, after puberty, the principal characters that it had during childhood, and approaches in its form more or less closely to that of the male. But, as M. Nægèle remarks, if this were really the case, the relation of the diameters with each other, and the character of the pubic arch, should be such as are observed in the young girl and the male. But all the known pelves of this variety exhibit quite the contrary. Nor are they more in consonance with that of a rickety person; and, besides, the rest of the skeleton has none of the characters appertaining to this disease.

Wherefore, it is certainly the wisest plan to say, with the illustrious Heidelberg Professor, that we have no positive data concerning the causes that give rise to the general narrowing of the pelvis; and that such pelves, as well as unusually large ones, should rather be considered as a freak of nature, belonging to the same category as a want of proportion in the head, which is not unfrequently found too large, or too small, relatively to the rest of the body.

§ 2. Of the Pelvis Deformed by Rachitis.

We are not about to enter here into a detailed consideration of the causes that preside over the development of *rachitis;* for the general phenomena produced by them, and, more especially, the greater softening, fragility, and flexibility of the osseous tissue, are so well known to pathologists that we need only mention them; but our present duty is to study their influence in the production of the deformities of the pelvis.

But this softening, or want of resistance on the part of the bones, is not of itself sufficient to explain the various deformities exhibited by the pelvis; because, except in certain very rare cases, in which the osseous tissue is almost gelatinous in its consistence, it must be evident that the bones can only give way and become distorted by the action of an exterior force, without which their conformation would remain intact. For where rachitis affects them, it has no other immediate consequence than to diminish their solidity, and of itself contributes in no wise to the alteration of their shape; we must seek in the influence of some external force, which is wholly independent of the principal disease, for the cause of the deformity. Now, this exterior force sometimes resides in the muscular action, though still more frequently (so far as regards the pelvis) in the weight of the parts it has to support; for, being placed, as we have elsewhere described, below the trunk and directly upon the lower extremities, to which, in the erect position, it transmits the whole weight of the upper parts of the body, the pelvis is found in the most favorable conditions for the production of deformity. The weight of the trunk, which, in the erect posture, is transmitted from the lumbar vertebræ to the heads of the femurs in the direction of two oblique lines that intersect the sides of the superior strait, manifestly tends to augment the curvature of the posterior part of the ilium, and to depress the

osseous circle which the pelvic cavity represents; and this weight, acting at first more especially on the base of the sacrum, has a tendency to push the latter insensibly forwards. The pubic bones would be equally pressed towards the sacrum, though in such a manner that their posterior extremity (the one nearest to the acetabulum, which supports the weight) gets somewhat nearer to the sacro-vertebral angle than does their anterior or symphyseal extremity; whence we may learn why the contractions of the pelvis oftener affect the superior strait than other parts; and why, at this strait, the antero-posterior and oblique diameters, and the sacro-cotyloid interval, are far more frequently contracted than the transverse ones.

And it will be equally evident why, when the weight acts more particularly on one side of the pelvis, the collapse is more marked in that direction, if we bear in mind the change that then takes place in the centre of gravity from the inclination of the spine, the curvature of which so often precedes the deformity of the pelvis, as also the very unequal pressure of the weight of the body on the two sides of the pelvis, where a difference of length in the lower extremities depresses one of the coxal bones more than the other; whereby the acetabulum of one side is thrown almost directly under the sacrum, and at the same time receives the weight very obliquely. (Bouvier.) It is further evident that the customary attitude of the individual, and the nature of her exercises, must likewise add to the irregularity in the figure of the pelvis.

If the child is in the habit of sitting much, the weight transmitted by the lumbar vertebræ may likewise press the sacro-vertebral angle forward; but the sacrum also often yields, and its base is carried forward simultaneously with the point of the coccyx, and the antero-posterior diameters of both the superior and the inferior straits are affected.

The lateral compression, operating from one side to the other, which is far less common than the preceding, or the shortening of one or more of the transverse diameters, supposes an action diametrically opposite, and it generally results from a lateral force acting from without inwards; which force may be referred either to the weight of the body, where the child uniformly reposes on its side, or to the unequal pressure of some improperly adjusted bandage, or the arms of an awkward nurse. But if, on the contrary, the infant habitually leans more towards one side than the other when seated, one of the ischial tuberosities, having to support a more considerable weight than its fellow, may be distorted inwardly; sometimes even the pressure will be applied successively to each, with the effect of bringing them very near to each other.

Rachitis affects first the bones of the lower extremities, and ascends gradually to the upper parts; in a word, it has an upward tendency. From this results a most important practical consequence, namely, that a deformity of any part of the skeleton from rachitis implies, almost necessarily, deformity of the bones situated below it.

Rachitis is a disease peculiar to infancy, and this peculiarity of only exerting its action during the early years of life, satisfactorily explains how the affection may have two different modes of acting on the pelvis; one of which consists of a softening of the bones, and their consequent yielding,

and the other, of a sort of arrest in their development. "Thus," M. Guerin says, "it would appear from my researches that most of the bones of a rachitic skeleton, when compared with those of a normal one, exhibit an arrested development as regards their different dimensions; which reduction, *independently of what results from the deformity of the bones*, may amount to one-half of their ordinary size; and further, that this reduction is generally greater in the lower parts of the skeleton, and gradually diminishes from below upwards, from the bones of the legs to the femurs, from these latter to the pelvis, and from the pelvis to the upper extremities and spine, &c." It is, therefore, on the lower extremities particularly, and on the coxal bones, which are appendages of them, that this arrested development exerts its action. "Whence," says M. Dubois, "it necessarily results that the ossa innominata are generally much less developed in rachitic pelves than in others; and this disposition must powerfully contribute, together with the deformity that usually accompanies it, to contract the limits of the cavity, which these bones, in a great measure, circumscribe; and I am the more convinced of the importance of this fact, since, in several instances of deformity occurring in individuals known to be rachitic during infancy, it has appeared to me that the yielding of the bones to the degree in which it existed would have been wholly insufficient to create such insurmountable difficulties, if the bones themselves had been as fully developed as they ought to have been." (*Thèse de Concours.*) And we may mention, as another fact bearing on the same point, that the pelvis of the patient on whom M. Moreau performed the Cæsarean operation, had experienced the double influence of rachitis just mentioned; for, though but little deformed, its antero-posterior diameter was only two and three-eighths of an inch in length.

This influence over the development of the pelvic bones is dependent solely on the tender age at which the affection appears, since it occurs in childhood, as stated, that is, at a period when the pelvis is far from having acquired its perfect organization; whereas malacosteon does not appear until after puberty, in other words, at an age when the ossa innominata have reached their normal development; and, therefore, although it may soften the bones, it cannot oppose their growth.

Lastly, this action is not set aside by the cure of the disease, but it continues to be felt during the whole period of development, so that, says M. Guerin, the sum of reduction exhibited by the bones of rickety adults, is made up of two successive results, namely, of the reduction dependent on an absolute arrest, or a mere diminution of growth during the disease, and of that caused by a retarded growth subsequent to the malady. This is an important practical remark, showing how far the influence of rachitis over the osseous system may extend.

To recapitulate,—rachitis produces deformity of the pelvis in two ways:

A. By altering the shape of the bones.

B. By arresting development.

The most striking characters of a rachitic pelvis are as follows:—

1. The antero-posterior diameter of the superior strait is always shortened, and the same is generally true for the oblique diameter. The transverse

diameter is less frequently shortened; sometimes it is normal or even lengthened.

2. The sacrum is less curved.

3. The diameters of the inferior strait are usually normal, and the transverse diameter, in a certain proportion of cases, is lengthened.

4. The angle formed by the pubic arch is increased.

Fig. 96.

Pelvis deformed by rachitis.

§ 3. Deformity from Osteomalacia.

Osteomalacia, like rachitis, by producing softening of the bones, diminishes their power of resistance. Instead of appearing during infancy, it occurs only in adults, often attacking women who have previously had one or several children. The softening produced by osteomalacia is generally much greater than the loss of resistance occasioned by rachitis, whence it follows that, aside from some exceptional cases, such as the one mentioned by Nægèle, the greatest contractions of the pelvis are due to osteomalacia, which sometimes deforms the skeleton to an incredible degree.

This disease may attack any of the bones of the skeleton, though it usually begins with the pelvis.

When their softening has occurred, the bones forming the cavity of the pelvis have their shape changed as in rachitis, under the influence of two causes, namely, the weight of the parts which they are obliged to support, and the contraction of the muscles attached to them. In this case, however, as the weight of the body is greater, and the muscular action stronger, the deformities are greater also. We would add that the development of the bony system is not arrested by osteomalacia, and that the conditions arising from the various habits and motions of the patient are liable to produce peculiar deformities which have been successfully studied by Stein and Kilian.

It may be stated, in a general way, that a pelvis deformed by osteomalacia is characterized by compression of its lateral parts with projection of the pubic symphysis which is pressed forward by the approximation of the two horizontal branches of the pubis. The iliac fossæ are crowded inward, and the curvature of the sacrum is always greater than in the normal condition. The inferior strait is more deformed than the superior one; all its diameters are altered, but there occurs more especially a considerable approximation of the tuberosities of the ischia and of the ischio-pubic rami.

Fig. 97.

Pelvis deformed by osteomalacia.

To recount the peculiar characteristics of the pelvis deformed by osteomalacia, we should say:—

1. All the diameters of the superior strait may be shortened, though the deformity is least in the antero-posterior direction.

2. The concavity of the sacrum is increased, and the coccyx projects greatly toward the axis of the inferior strait.

3. All the diameters of the inferior strait are contracted: the approximation of the tuberosities of the sacrum is, however, the principal feature.

4. The angle formed by the pubic arch is far less open than in the normal condition, and may even be almost effaced.

According to the observations of Dr. R. P. Harris, osteomalacia is entirely unknown as a disease in America. The cases delivered in this country have been foreigners, while out of 112 Cæsarean operations in the United States, not one was performed on account of this deformity.

§ 4. Oblique Oval Pelvis.

The variety of deformity recently described by M. Nægèle, under the title of *oblique* contraction, may evidently be referred to a shortening of one of the oblique diameters. His book on the subject has recently been translated with the greatest care by M. Danyau. We submit the following translation of it, which we owe to the courtesy of our professional brother:

"The principal characteristics of these pelves are the following:

"1. A complete anchylosis of one of the sacro-iliac articulations, or a perfect fusion of the sacrum and one of the iliac bones together.[1]

"2. An arrest of development, or an imperfect development of the lateral half of the sacrum, and deficient size or contracted opening of the anterior sacral foramina on the anchylosed side.

Fig. 98.

A figure taken from M. Nægèle's work, which exhibits the characters of the oblique-oval pelvis in a high degree.

"3. On the same side, a reduced size of the os ilium, and, consequently, a diminished extent of the ischiatic notches of this latter; that is to say, the distance between its anterior superior and its posterior superior spinous process, as well as an imaginary line, drawn at the entrance of the pelvis, commencing at the spot where the sacro-iliac symphysis would be (if it existed), and running along the linea innominata and the linea ilio-pectinea as far as the pubic symphysis, is shorter here than on the opposite side. Further, the part corresponding to the articular

[1] We retain the expression *anchylosis* on account of brevity, and because it is the one generally used to designate the condition under consideration; but we formally protest

surface, on the anchylosed bone, which is here continued into the sacrum without any transition, extends neither so high up, nor descends so low, as upon the opposite side, or as it would in a well-formed ilium; or, to explain myself more clearly, if we suppose the ilium and sacrum of the anchylosed side to be temporarily separated, and then reunited through the intervention of a fibro-cartilaginous disk, as occurs in the natural state, the articular surface or the junction of these two bones would be found shorter, and, of course, would not descend so low as on the opposite side, which is exempt from fusion, or as it does in a well-formed pelvis.

"4. The sacrum seems to be distorted toward the fused side, and it also has its anterior surface turned more or less towards this side, whilst the symphysis pubis is pressed over to the opposite one; in consequence of which arrangement the symphysis is no longer found directly in front of the promontory, as it ought to be, but is caused to assume an oblique position.

"5. The internal surface of the ilium, on the anchylosed half, is more flattened in that part which contributes to the formation of the pelvic cavity, and sometimes even (in cases of great deformity) is almost entirely plane; so that, for example, a line drawn from the middle, or even the posterior extremity of the linea innominata, and running along the body and horizontal branch of the pubis as far as the symphysis, will be nearly a straight line; but we have never seen an inclination inwards at this part, nor have we particularly observed that inward projection of the horizontal branch of the pubis that is found in pelves deformed in consequence of mollities ossium in the adult.

"6. The other lateral half of the pelvis, or the one where the sacro-iliac articulation still exists, likewise departs from the normal condition; although, where the obliquity is inconsiderable, we may easily deceive ourselves at first sight, and be induced to suppose that there is a natural conformation of the non-anchylosed half; such, however, is not the fact, as can be proved by supposing two pelves to be similarly deformed, with this difference only, that in one the fusion of the sacro-iliac articulation takes place on the left side, while in the other it is on the right; and then making a section of each through the symphysis pubis and the middle line of the sacrum; when, by attempting to fit the right half of the first of these pelves to the left half of the second, by bringing the cut surfaces of the two sacrums against each other, we shall find that the pubic bones are separated by an interval of from three to four inches.

"Consequently, the lateral half of the pelvis, exempt from fusion, not only participates in the abnormal situation and direction of the bones, but also in their irregular form; and this to such an extent that, if a line should be drawn on the non-fused side from the middle of the promontory, along the linea innominata and linea ilio-pectinea as far as the symphysis pubis, it would be more curved in its posterior, and less so in its anterior half, than in a normal pelvis."

against the imputation of having admitted that these bones had originally been well formed, and had only contracted this continuity of structure in consequence of some disease. Perhaps the term *synostosis* or *synezesis* would better designate the perfect fusion here alluded to.

Thence it follows:

7. A. That the pelvis is contracted obliquely, that is to say, in the direction of one of the ordinary oblique diameters, while in the other (which runs from the point of anchylosis to the opposite cotyloid cavity) it is not at all diminished, but may even be larger than usual, when the obliquity of the pelvis is greater.

"Wherefore, the superior strait, or, in other words, the surface limited by a line traced along the spines of the two pubes, and thence along the lineæ innominatæ and prolonged on the sacrum, as well as the imaginary plane at the centre of the pelvic excavation (in the place where we usually admit the middle opening of the pelvis, *apertura pelvis media*,) will resemble, strictly speaking, an oblique oval when viewed in front; the transverse or small diameter of which will be represented by the contracted oblique diameter, and its great, or longitudinal one, by the opposite oblique diameter.[1] Therefore, as regards their form, the pelves in question might very properly be designated by the title of the *oblique-oval pelvis* (*pelvis oblique-ovata.*)

"B. That the distance from the promontory of the sacrum to the point corresponding to either cotyloid cavity (the sacro-cotyloid interval),[2] as well as that from the apex of this bone to the spines of the ischia, would be less on the side where the anchylosis exists.

"C. That the distance from the tuber ischii on the anchylosed half to the posterior superior spinous process of the opposite ilium, as also that between the spinous process of the last lumbar vertebra and the anterior superior spine of the ilium on the anchylosed portion, are smaller than the corresponding dimensions of the opposite side.

"D. That the distance from the inferior border of the symphysis pubis to the posterior superior spinous process of the ilium is greater on the anchylosed bone than on the opposite side.

"E. That the walls of the pelvic excavation converge somewhat obliquely from above downwards, whereby the pubic arch is more or less narrowed, and therefore made to approach in a measure to the form of the male pelvis, as a natural consequence of the improper direction of its ramus which is turned towards the flattened pelvic wall. Of course, these two dispositions, as also the narrowing of the ischiatic notch, the diminution of the distance between the two ischiatic spines and the one-sided and defective development of the sacrum, will be in direct relation with the degree of obliquity.

"F. And finally, that on the flattened side the acetabulum is inclined much more anteriorly than in the normal state, whilst on the opposite side it is turned almost directly outwards; and hence, when examining the pelvis from in front we can look directly into the first cotyloid cavity, but the view will only graze the second, or possibly may embrace a small part of

[1] From this it is evident that the lines connecting those points, between which we are accustomed to imagine the antero-posterior and transverse diameters as passing, do not cross at right angles in the oblique-oval pelvis, and that the latter cannot be regarded as possessing oblique diameters such as are attributed to symmetrical pelves.

[2] For sake of brevity, we use this expression here in order to indicate the distance referred to, it being one which J. Burns thought it necessary to measure and establish, for the purpose of assisting in an exact representation of the form of the pelvic opening.

its excavation. Further, to give as clear an idea of the deformity as possible to those who have never seen a pelvis of the kind, we will observe that at first sight the pelvis looks as if it had been pressed in by some external force acting in an oblique direction from below upwards and from without inwards, and making its influence felt on the anterior pelvic wall at the cotyloid region, whilst the other half of the lateral wall has been simultaneously pressed from without inwards, at its posterior part.

"Another peculiarity of these pelves is, that they only differ from each other by the degree of obliquity, and on that side only where the anchylosis takes place; whereas, in all other points, that is, in the principal characteristics of their malformation, they are as similar as two eggs. This remark is so true, that an experienced person, who was unaware of the circumstance, would be disposed to take two different specimens, if presented to him separately, for one and the same, and it would even be difficult to persuade him of his error; an instance of which we shall presently give.

"As to the other conditions of the bones in the oblique-oval pelvis (laying aside the deviations just enumerated), that is, as regards their strength, size, texture, color, etc., they do not differ in any wise from healthy bones, such as those met with in young persons exempt from all deformity. Thus, for example, none of those signs are observed in them, neither as to their form nor in other respects, which are so often found after rachitis or malacosteon; for if the existing deformities were disposed to disappear, all the pelves we have yet had an opportunity of examining would bear a general resemblance to well-formed ones; most of them were of the medium size, and the others were either above or below it, but in no one of the cases that we have particularly traced out has there been rachitic diathesis, and in no one did the phenomena, symptoms, or morbid modifications exist, which would have either preceded or followed the English malady, or mollities ossium, after puberty; and further, in no instance could the action of external prejudicial influences, such as falls or blows, etc., be detected, and there were never any antecedent pains or lameness; although, in one instance, we suspected a slight limping, from seeing the patient walk, but other skilful persons, who were present at the examination, did not detect it, and the relatives and all the family of the woman in question positively declared they had never remarked anything of the kind.

"In two of the specimens of this variety in our collection which have the lower vertebræ attached, the spinal column is straight in the lumbar region; but in the others it is inclined on the side exempt from anchylosis. In all that are provided with the lumbar vertebræ, the anterior face of the bodies of these bones is more or less directed towards the anchylosed side."

One circumstance yet remains to be explained, that is, the complete fusion of the sacrum and ilium together, and the consequent disappearance of the sacro-iliac articulation on the contracted side. Now, is this anchylosis congenital? Is it the result of some inflammation occurring after infancy? or is it to be attributed to the curvature of the vertebral column? We confess that sufficient materials are yet wanting to decide the question although M. Naegèle seems to think that this fusion, as well as the deform-

ity of which, in his estimation, it is the essential character, results from an anomaly of original development; "but," he adds, in conclusion, "I am not prepared to decide positively." (For further details, see M. Danyau's translation.)

Whether congenital, or the consequence of an accidental disease, Professors Gavarret and Paul Dubois regard this anchylosis as the cause of the flattening of the ilium upon the same side. When, says M. Dubois, one of the sacro-iliac symphyses is affected with anchylosis, the corresponding coxal bone becomes flattened, and the same alteration is produced on both sides when the two symphyses are ossified. For my own part, I cannot admit this relation of cause and effect, for there is nothing to prove that in M. Nægèle's oblique oval pelves, the deformity of the ilium had been preceded by anchylosis. On the contrary, we have shown that, as M. Nægèle himself acknowledges, there are pelves which present all the characters of the oblique oval ones, *excepting the anchylosis of the sacro-iliac symphysis.* How, then, can the anchylosis be regarded as causing the deformity?

Dr. Falri thinks that this deformity is occasioned by compression of the pelvis during intra-uterine life, during labor, or during early childhood.

The reader will see, by the translation just given, that M. Nægèle attaches a very great degree of importance to the anchylosis of the sacro-iliac articulation, which he makes a pathognomonic character of the deformed pelvis, described by him under the name of the *oblique oval;* but, if I might hazard an opinion after such high authority, I should unhesitatingly reject this proposition, because there are numerous pelves which present all the characters of these oblique ones, described in the monograph of the Heidelberg professor, and yet in which there is no fusion of either sacro-iliac articulation to be found. M. Nægèle himself, with that candor characteristic of the truly learned man, speaks in his admirable work of pelves that were similar to those previously described by him, and which only differed from them by the absence of anchylosis. He alludes to several others, and states that he knows of the existence of many more, the exact description of which has been promised him. I shall have occasion hereafter to revert to this subject, but I cannot refrain from saying now, that if the anchylosis is no longer to be considered as a constant phenomenon, as a pathognomonic character of the pelvis in question, if it is nothing more than a pathological coincidence, happening in most cases, then I can only see in the oblique-oval pelvis the association of two of the three types, to which we have referred all the varieties of pelvic malformation; for, in considering it in a practical point of view, and laying aside its extraordinary anatomical peculiarities, it will exhibit, simultaneously, the compression of one of the antero-lateral walls, and the oblique prominence of the sacro-vertebral angle.

§ 5. Malformations dependent upon a Previous Deformity in another Part of the Skeleton.

We have already alluded, in advance, to the influence that a malformation of the spinal column, or of the lower extremities, might have over the shape of the pelvis, and we now proceed to illustrate the mode of action in both cases.

A. *Deviation of the Vertebral Column.*— For a very long period all the deviations of the spinal column were attributed to the baneful influences of rachitis; but owing to the able researches of Bouvier, of Guerin, and many others, this opinion is no longer tenable, since it is now well ascertained that several other diseases may produce abnormal curvatures in this column; and this distinction is quite as important to the accoucheur as it is to the orthopedists, for it establishes at once a line of division between those deviations which nearly always coincide with an imperfect conformation of the pelvis, and those which often exist, even where the latter is well formed. The former are of a rachitic nature; but the latter are developed under the influence of some other affection. For instance, in sixty-nine cases of deformity in the vertebral column, described by M. Bouvier, the pelvis was in a normal condition, and the extremities were nearly all exempt from alteration in fifty-seven, and but twelve were accompanied by a malformation of this cavity, and by an incurvation of the limbs.

It must not be supposed, however, that the deviations of the spine which are not dependent on rickets, have no influence whatever over the direction and shape of the pelvis. It is only in subjects of advanced age, as a general rule, that curvatures of this column, happening after infancy, will ultimately determine changes in the form and direction of the pelvis; and, therefore, they have but little interest for the accoucheur.

As regards the curvatures produced by rickets, though they be not the essential cause of pelvic deformities, yet they do not the less exercise an unfavorable influence over the degree of contraction, and the irregularity in the shape of the pelvis; for the same action which gives rise to these deformities in old persons, also produces them, in a great measure, in rickety children. In either case, the pelvis yields under the influence of the spinal deviation; with this difference only, that what takes place slowly in the aged, is rapidly effected in the child, because in the latter the softening of the bones favors the action of the cause.

The principal alteration consists of an increase of the angle formed by the junction of the lumbar column with the base of the sacrum, which gives the pelvis a figure more or less similar to that described by Professor Nægèle, under the title of the *oblique-oval.*

B. *Congenital Luxations of the Femur.* — M. Sedillot, in a very interesting memoir on the congenital luxations of the femur, first called attention to the influence which these displacements might exercise on the conformation of the pelvis. The effects of this accident are manifested both in the greater and lesser pelvis, as may be seen from the following distances which he obtained in a case of double dislocation upwards and outwards, into the external iliac fossæ, by measuring the principal dimensions of the pelvis: —

1. From one anterior superior spinous process to the other, . . . 8 inches
2. From the middle of one iliac crest to the same point on the opposite side, ... 8½ "
3. From the middle of the iliac crest to the margin of the abdominal strait, ... 3¼ "
4. From the middle of the iliac crest to the tuber ischii, . . . 6¼ "

Superior or Abdominal Strait.

5. Antero-posterior diameter, ... 4⅛ inches
6. The same diameter taken from the pubis to the articulation of the first piece of the sacrum with the second,[1] . . 4½ "
7. Bis-iliac or transverse diameter, ... 4⅛ "
8. Oblique diameter, ... 4⅛ "

Perineal Strait.

9. Coccy-pubic diameter, ... 3½ "
10. Transverse diameter, ... 5½ "
11. Oblique diameter. . . . . 4¾ "
12. Summit of the pubic arch, ... 1½ "
13. Base of the arch (taken on a level with the inferior border of the oval foramen), ... 4⅛ "

Pelvic Excavation.

14. Depth of the posterior wall, ... 5 "
15. Depth of the anterior wall, ... 1⅛ "
16. Thickness of the pubic symphysis, ... ½ inch.
17. Depth of the sacral concavity, ... 1⅛ inches.
18. From the summit of one ischiatic tuberosity to the same point on the opposite side, ... 5¼ "

From these measurements it appears: 1st. That the transverse dimensions of the greater pelvis are considerably lessened by the vertical elevation of the iliac fossæ, which approximate each other to such an extent as only to leave an interval of eight and a half inches, whereas the normal distance is ten and a half inches. 2d. That the relations which exists, in the normal state, between the antero-posterior and transverse diameters of the superior strait is changed; since the transverse diameter is somewhat shorter here

[1] The antero-posterior diameter is generally measured from the upper and internal part of the symphysis pubis to the superior border of the sacrum: but M. Sedillot very justly remarks, that in many of the pelves which are the seats of a double congenital luxation, the upper margin of the sacrum, in consequence of the great prominence of the sacro-vertebral angle, is found far above the pubis, and the articulation between the first two pieces of the sacrum is then on a level with the superior surface of this bone. Now, in such a case, the true antero-posterior diameter of the abdominal strait would extend from the upper border of the pubis to the part of the sacrum found on the same level, and this interval, therefore, is the only important measurement. But this observation is not new, as it had previously been made by Bland, and repeated by Merriman, in the following note: "Although the sacrum be carried so far forward that it seems to reduce the antero-posterior diameter at the entrance of the excavation to two or three inches, it is necessary in determining the degree of contraction to observe the difference in elevation between the sacro-vertebral angle and the upper part of the symphysis. The pubes being placed something lower than the greatest projection of the sacrum, and opposed to a part of that bone that is directed strongly backward, the real distance between them may be much more considerable than it may seem to be to the touch. Whence it happens that in cases where the projection of the sacrum has occasioned exceeding great difficulty in the beginning of the labor, opposing an almost insuperable bar to the entrance of the head of the child into the pelvis, by directing it too far forward over the pubes, yet when that direction has been altered by the use of instruments, or by any other means, and the head brought into the line of the centre of the pelvis, the conclusion of the labor has been frequently effected with very little exertion or force." — *Bland's Observations.*

than the antero-posterior one; whereas, in the ordinary state, it is nearly an inch longer. 3d. That an inverse change takes place at the inferior strait, the bis-ischiatic diameter being five and a quarter inches, while the coccy-pubic one is but three and a half inches.

These last modifications, says M. Sedillot, are easily explained, being the consequence of the natural position of the femurs in the external iliac fossæ; for individuals afflicted with a double luxation of this kind, walk with the legs wide apart, so as to bear and rest the heads of the thigh-bones against the sides of the ilia; though the effect would still be the same, even if their progression were not performed in this manner, because the external, lateral and superior surfaces of these bones, which usually incline outwards, will always be pressed upon to a certain extent, by the heads of the femurs, which have a tendency to straighten and carry them inwards. Whence the pelvis, from being thus compressed laterally, is elongated from behind forwards, and forms, in this latter direction, a more or less acute angle. The iliac fossæ, experiencing the pressure more directly, have yielded in a marked degree, though more at their middle than in front, because the head of the thigh-bone is thrown far back, and compresses the middle more than the anterior part of these fossæ. The ilium is often rendered more straight and nearly vertical, instead of being inclined outwards; and, should this phenomenon exist on both sides, it might interfere with the regular development of the womb; but if on one side only, it might occasion an obliquity of this organ in the opposite direction.

The anterior margin of the ilium also presents a singular disposition; for the conjoint tendon of the psoas magnus and iliacus internus muscles, which is inserted in the lesser trochanter, is then changed from its usual direction, and is carried upward by the ascent of the thigh-bone, and, as a consequence, this tendon deepens and changes the direction of its groove; whereby the anterior inferior spinous process is turned aside in a more or less sensible degree.

The shortening of the transverse diameter of the upper strait is evidently due to the lateral pressure made by the heads of the femurs almost perpendicular to this strait; and, as a flattening in the transverse direction is necessarily accompanied by an elongation antero-posteriorly, the sacra-pubic diameter is found augmented in a corresponding degree.

The examination of the inferior strait also exhibits a very curious phenomenon, just the reverse of what we have met with at the abdominal one; that is, there is a considerable increase in the extent of its transverse diameter, with a notable diminution in that of its coccy-pubic one. Here, also, the situation of the femurs must be referred to in explanation of the circumstance; for these latter are carried far upwards, outwards, and backwards, since their superior articular extremities have escaped up into the external iliac fossæ; and they keep the surrounding muscles constantly tense (more particularly the quadrati, the gemelli, and the internal obturator muscles, which run from the ischiatic tuberosities to the extremity of the thigh-bones), and thus drag the ischium outwards; the lower fibres of the obturator externus and the adductor muscles, and the internal part of the articular capsule, act in the same manner on the columns of the pubic arch,

thereby producing a wide separation of the two ischia. The latter, in turn draw on the greater and lesser sacro-sciatic ligaments, thereby creating a greater curvature in the inferior bones of the sacrum and coccyx, and consequently the diminution of the coccy-pubic diameter, as also a greater depth in the concavity of the sacrum. The want of depth in the pelvic excavation depends on the same cause; for, when the ischium is drawn towards the external iliac fossa, the lower part of the pubic arch is necessarily bent out, and, as a consequence, the depth of the pelvis anteriorly is diminished. (*Sedillot.*)

The weight of the body when erect, is the principal agent of this deformity; which essentially results, as just stated, from the tension exerted from within outwards on both sides by the capsular ligaments of the two deformed articulations, which hold the trunk suspended, as it were, between the thigh-bones; and the force exerted by these ligaments on the pelvis is equal in power to the tendency of the weight of the body to elongate them. Lastly, the contraction of the cotyloid cavity has some little influence over the change in extent, which the pelvis undergoes, though it explains but a very small part of the deformity. (*Bouvier.*)

[Dr. Lefeuvre (Paris, Thesis, 1862) very properly insists upon the changes produced in the inclination of the pelvis. The most constant effect, says this physician, of congenital luxations of the femur, is a deviation of the normal inclination of the pelvis. The position which the femurs occupy in the external iliac fossæ so alters the conditions upon which the stability of the body depends, that the pelvis, pressed from above by the weight of the parts above it and supported only from behind, becomes tilted forward. To this inclination of the pelvis is due the lumbar depression, which is increased still more by the posterior projection of the shoulders required for the maintenance of equilibrium. The normal inclination of the superior strait, which was estimated by Osiander at 30 degrees, and by Levret at 23 degrees, was studied very carefully by Naegèle, who brought it to 59 degrees. In congenital luxations the inclination may amount to 80 or 85 degrees, as is shown by the specimens, Nos. 739, 744, 763 C in Dupuytren's museum. It may even be still greater, become vertical, or even go beyond the perpendicular.

The inclination of the inferior strait is increased at the same time, though not always in the same proportions, on account of the variable depth of the cavity of the pelvis.

This forward inclination of the pelvis causes the anterior face of the sacrum to become inferior, and it may happen that the vertebral extremity shall be found lower than the coccygeal. The symphysis of the pubis becomes at the same time horizontal instead of vertical.

When the luxation is double, the inclination is nearly uniform on both sides, and the vertebral column presents an antero-posterior curvature. When the luxation is single, at the same time that the pelvis is inclined forward, a lateral inclination also takes place, due to the lowering of the luxated side on account of the want of support from the head of the femur. In this case the vertebral column will exhibit an antero-posterior curvature, with deviations toward the side of the luxation. (*Lefeuvre.*)]

The deformity is often irregular, or non-symmetrical, because the changes effected in the pelvis are more marked on one side than on the other; though, generally speaking, they are found to bear a relation to the degree

of organization in the new joint; and if any accidental articular cavity exists, they are more developed on that side.

A pelvis, which has been referred to by M. Gerdy in his learned report, read before the Academy, on congenital luxations, and which presents some very singular modifications, may be seen at the *Musée Dupuytren;* it only has one femur attached, which is fused outside of the anterior inferior spinous process of the ilium on the left side. The anterior superior spine of the opposite coxal bone is two inches higher than the left one, and both bones are fixed with an equal degree of solidity in these relative situations; the sacrum, though very short, is quite broad, and the superior strait exhibits a modification similar to what has just been described; as to the inferior strait, it is very large in every direction, because the sacrum is exceedingly short, and the anterior pelvic wall is bent, as it were, forward and downward, on the same transverse and vertical plane, instead of being curved or bent downwards and backwards as in the normal state. (See No. 252, *Musée Dupuytren.*)

We have extracted from the memoir of M. Sedillot only those peculiarities that seemed important to be known, though we trust that enough has been given to prove that Dupuytren was greatly mistaken when he asserted that the phenomena of primitive luxations had no influence whatever over the development of the pelvis, and that the latter offered no greater obstacles to delivery than it does in well-formed persons; the incorrectness of which assertion is doubtless sufficiently proved by the details into which we have entered. However, it must be acknowledged that in such cases the delivery is seldom impossible, although it may be attended with some difficulties; at least, no instance has yet been recorded in which the expulsion of the fœtus could not take place without having recourse to a bloody operation on the mother or child, which is most certainly owing to the fact that, in congenital luxations, the contraction takes place in the longest diameters, both of the superior and inferior straits.

In a recent publication, M. Lenoir expresses an opinion so far contrary to that of M. Sedillot, as to suppose that double congenital luxations produce no notable alteration of the shape of the pelvis; and he mentions, in support of his view, the pelvis of a young woman, the dimensions of which he gives. These dimensions hardly differ from those of the normal pelvis, except as regards the inferior strait, where they present an increase in extent of rather less than half an inch.

The observations of M. Lenoir prove merely that the remarks of M. Sedillot are not applicable to all cases; still, the facts observed by the latter surgeon are of great value, showing as they do that congenital luxations may in some cases produce a marked change in the form and dimensions of the various parts of the pelvis.

M. Lenoir insists much more strongly than M. Sedillot upon the effect of simple congenital luxation. The latter is, he states, accompanied by an arrest in the development of all that side of the pelvis corresponding to the luxation, which atrophy produces so great a deformity of both straits and the excavation, that we may be certain, that although delivery is not always rendered impossible thereby, the labor will at least be longer and more difficult.

The latter proposition is, I think, by far too absolute, and facts are wanting to prove it. The deformity which follows simple luxation is much less than that resulting from a double displacement, and the specimen of M. Pacoud, described by M. Lenoir, seems to me in no wise to justify his assertions.

Is M. Lenoir more fortunate in his endeavor to trace a resemblance between a pelvis deformed in consequence of a simple luxation than the oblique oval pelvis of M. Nægèle? The points of difference between these two pelves are so numerous, that he has seemed to me to force whatever analogies may exist, by placing them in the same category. The anatomical characters do not justify it, and the prognosis especially is much less serious; finally, the indications to be fulfilled in both cases are essentially different.

c. *Non-congenital Luxations.*—The atrophy of the iliac bone corresponding to the dislocated femur may also be met with in luxations occurring after birth, whether the luxation be the result of an accident, or consecutive to an organic alteration of the articular surfaces, as in coxalgia. To produce this effect, all that is necessary is, that the luxation should remain unreduced, and that it should have occurred within the first years of existence. Now, as this atrophy was the cause of the deformities of the pelvis studied in the preceding paragraph, it may have the same consequences in the case under consideration. It is also plain that the pelvic deformity will be great in proportion as the luxation shall have occurred at a very early age.

[As M. Depaul observes (*Bulletin de la Société de Chirurgie*, année, 1865), the cause of these luxations ought also to be taken into serious consideration. When traumatic, it is much less likely to occasion deformity of the pelvis than when consecutive to disease of the bones. In the same paper are found two cases mentioned by M. Blot of unilateral luxation, caused by coxalgia in early childhood, giving rise to difficult labor. Cephalotripsy was necessary in the first case: the antero-posterior diameter measured three and a quarter inches; the right oblique diameter corresponding to the shortened member had its length notably diminished. In the second case, the antero-posterior diameter measured three inches, but as the patient was delivered prematurely, the fœtus was extracted with the forceps.]

d. *Lesions of the Inferior Extremities.*—The curvatures, so often met with in the lower limbs, do not always diminish their length in an equal degree; and this unequal shortening determines a variation in the pressure they make on the bottom of the cotyloid cavities; and, consequently, may affect the pelvis on the side where it is the greater. It is so true that the imperfect conformation of the pelvis is then dependent on a difference in the length of the lower extremities, that the latter may often be curved (provided they maintain the same length), without the pelvis being necessarily vitiated; and also, that where any inequality does exist between them, there is quite a constant relation between the deformed iliac bone and the longest limb. When a woman with deformed pelvis limps, she always does so on the sound and not on the diseased side, as one would be led to suppose at first thought.

It is further possible, that a shortening of one of the legs, whether result-

ing from a fracture, a luxation, or an atrophy of the limb, may produce the same result; more especially if these accidents take place in early childhood, when the pelvis is still far from having acquired its full development. Persons affected with chronic diseases of one of these limbs, and therefore under the necessity of walking with crutches, and of bearing the whole weight of the body on the sound leg, incur the same danger. Nevertheless, this latter circumstance has not always such an unfortunate influence; for Dr. Campbell mentions that he had an opportunity of examining the body of a woman who had made use of a crutch since the fourth year of her age, in consequence of a disease in her right lower extremity; this person, who died some time after delivery, had a perfectly formed pelvis. (*Campbell*, page 249.)

Amputation of the thigh, in a young girl, particularly in early childhood, is likewise capable of deforming the pelvis: thus, for example, Madame Lachapelle found the superior strait, in a female aged eighteen years, reduced to a moiety of its extent on the right side only, and pushed in totally towards the left thigh, which had been amputated four years previously. Indeed, we can readily imagine that, as the artificial limb only derives its point of support from the ischium, the acetabulum of the sound side will alone continue to be compressed by the weight of the body.[1]

ARTICLE III.

INFLUENCE OF DEFORMITIES OF THE PELVIS UPON PREGNANCY AND PARTURITION.

The deformities may certainly have an unfavorable influence over the progress of gestation; for, as we have already stated in the article on abortion, where the contraction of the straits accompanies an enlargement of the excavation, the womb, finding a more considerable space than usual in the cavity of the lesser pelvis, may become developed, and remain there beyond the ordinary period; and we have considered this circumstance as one of the causes of abortion, from the impossibility of its getting subsequently above the superior strait; and, when treating of retroversion, we remarked that this displacement was singularly favored by an increased depth in the concavity of the sacrum.

Even in cases of slight contraction of the superior strait, the sort of impaction which the uterus undergoes from the early stages of pregnancy,

[1] According to Campbell, the deformity of the pelvis may also be produced by contusions received on the dorsal region during childhood. I have, he says, met with several examples of the kind. A few years ago, I saw a patient who, when three years old, received a violent blow upon the lumbar region; the pelvis was in her case so deformed, that I thought it right to induce labor at the end of the seventh month. Although the pains were powerful, the head remained for seven hours in the excavation, but the child was nevertheless expelled. It lived eight days, and died in convulsions. Several fractures of the cranium were discovered at the autopsy, and several subcutaneous ecchymoses, caused evidently by the pressure to which the fœtus had been subjected during labor. (Campbell, *Introduction to the Study of Midwifery*, p. 248.)

This observation is too incomplete to justify the opinion of the author. Was the pelvis really contracted? Was not the woman rachitic? &c., &c.

may produce a violent compression of the organs situated in the excavation. Van Dœveren mentions a very curious case, in which the patient experienced such acute pain in the hypogastric region from the third month of gestation as at first to excite fears of abortion. The symptoms continued notwithstanding the use of the most rational means. By careful examination, he detected an oval tumor, painful to the touch, and extending above the umbilicus. The patient urinated frequently, though in but small quantity at a time. He suspected a dropsy of the uterus. The suffering continued in spite of all that could be done, and the patient grew worse and worse, until one morning when he found her much better and relieved of her excruciating pains. She no longer had fever nor difficult respiration, and the tumor had disappeared; the abdomen was flatter, softer, and presented an obscure fluctuation. He thought that the uterus had been ruptured, and, notwithstanding the contentment of the patient, gave the most unfavorable prognosis. She died, indeed, two days afterward. At the autopsy it was discovered that the greatly distended bladder had given way at its upper part. The uterus filled the lesser pelvis so completely as to leave no space between it and the walls of the pelvis. It compressed the vessels, the pelvic nerves, and the rectum, as also the urethra, against the pubis. The sacro-pubic diameter was but three inches and eight lines in extent.

When the transverse diameter of the greater pelvis is contracted by the straightening out of the iliac crest, as occurs in double congenital luxations of the femur, the development of the uterus is considerably impeded during the latter months of pregnancy; and this difficulty, according to Ant. Dubois, may prove a cause of premature labor. Where the straitening exists on one side only, the inconvenience is less; but still it may possibly contribute to the production of considerable uterine obliquity on the opposite side.

In general, however, with the exception of certain inconveniences, which evidently depend more on the extraordinary obliquity of the planes of the pelvis than on a diminution of its cavity, and to which we shall take occasion hereafter to revert, such contracted pelves rarely interrupt the course of gestation; but they have a far different influence upon the labor, to which we now ask the reader's attention more particularly.

The impediments to the delivery will usually be greater as the deformity of the pelvis is the more considerable; however, this proposition, although true in the majority of cases, is not absolutely so, since the degree of narrowing is not the only point that demands the accoucheur's attention; for the child's position, the size of its head, the flexibility of the cranial bones, the power of the uterine contractions, and the variable degree of relaxation of the pelvic articulations, are so many important circumstances which claim his consideration. One woman, perhaps, is happily delivered at term, whilst another, whose pelvis offers the same dimensions, will require the intervention of art for her relief. The same woman may be spontaneously delivered of her first child, and yet present such difficulties at the second labor that the mutilation of the fœtus may be deemed to be the only remedy for sparing her a bloody operation, without our thereby concluding that her pelvis had become contracted between these two pregnancies; for these dif-

ferences might depend solely on the greater volume, or a less degree of reducibility of the head, or the bad position of her second child, &c. Most accoucheurs have observed facts of this nature, but we only present the following: A patient presented herself at the Clinique, in 1838, whose pelvis was only two and three-quarter inches in its sacro-pubic diameters; she was delivered in eighteen hours of a living infant, at term, the dimensions of which were nearly normal, and whose head was scarcely deformed. Baudelocque relates having seen, at the amphitheatre of Solayres, the head of a fœtus which was elongated to such an extent that its greatest diameter measured nearly eight and a half inches, whilst the bi-parietal one was reduced to two and three-eighths, or two and three-quarter inches; and he speaks of another very similar instance; but in neither of these cases was the child's life compromised for a single instant. M. Martin, of Lyons, has known a rachitic woman to be delivered of a healthy infant at term, by the efforts of nature alone; where the autopsical examination showed that the antero-posterior diameter was only two and a half inches in extent (page 270.) What rendered this case still more extraordinary was the existence of scirrhous tumors in the substance of the uterine walls. The reductibility of the head, therefore, is sometimes excessive, but unfortunately it is almost impossible to appreciate this in a positive manner beforehand.

To this source of uncertainty, says Madame Lachapelle, let us add that, in certain women, the degree of mobility of the symphyses does not permit a general separation of the bones (which, even if it existed, would scarcely enlarge the area of the strait or of its diameters); but rather a mutual gliding of the articular surfaces upon each other, an overriding of the pubes, so that one of the innominata advances to a range with the sacro-vertebral angle, whilst the other recedes to a greater or less extent. It follows from this mechanism that one of the oblique diameters at the superior strait, the one corresponding to the long diameter of the head, is notably increased; and the sacro-pubic one is also found augmented by the advancement of one of the coxal bones. Finally, continues this skilful midwife, it may be possible for both hip-bones to glide forward simultaneously, thereby enlarging still more the antero-posterior diameter.

In most cases of deformity, the child's position is far from being an indifferent matter; for when the sacrum, in being carried forward, is at the same time turned to one side, whereby one of the lateral portions of the pelvis is more contracted than the other, who does not foresee that the labor may then be accomplished spontaneously, if the head presents in such a way as to offer its great occipital extremity to the well-formed side; and that, on the contrary, it would become impossible, if the occiput should correspond to the contracted one?

Where the contraction is so limited that it might possibly permit a spontaneous delivery, any unfavorable position of the fœtus would greatly add to the existing difficulties caused by the malformation of the pelvis; if, for example, instead of presenting by the vertex, the child should offer its pelvic extremity, there would be reason to fear an arrest of the head above the superior strait, after the escape of the trunk; the slowness of its passage through this strait would not often warrant the abandonment of the delivery

to the resources of nature, both from the dangers the infant incurs from a compression of the umbilical cord, and from the feebleness of the contractions of the womb, which, being almost entirely emptied and retracted, no longer retains its contractile properties. (See *Presentation by the Breech.*)

We need scarcely add, in conclusion, that a proper degree of energy in the uterine contractions bears so prominent a part in the accomplishment of labor that it cannot be overlooked. In certain cases, for instance, where the pelvis is so little contracted that the child's delivery is still possible by the application of the forceps, it is evident that frequent and strong contractions of the womb would render this instrument useless; again, the labor will terminate alone, in a case where the physician would have been obliged to interfere, if the pains had been too feeble or too slow.

We may conclude, therefore, that, in the question before us, there are a number of elements which may influence the result; and that, if the degree of narrowing of the pelvis is the most important point to be well ascertained, it is not the only circumstance upon which the obstetrician ought to base his determinations. For although the means of arriving at an exact knowledge of the extent of contraction are almost sure, yet, unfortunately, the same does not hold good with regard to the volume and the reducibility of the fœtal head, or the mobility and possible separation of the pelvic symphyses; and it is impossible to calculate in advance all the resources of the organism, or to know how far the uterine efforts will go. From our ignorance, on most of these points, arise the uncertainties and hesitations which so often prove fatal either to the mother or the child; uncertainties and hesitations that never influence persons that are not versed in all the difficulties of our art, but which are well understood by learned and experienced practitioners, who have frequently been under the painful necessity of making a decision and of determining a question whose solution might cost the lives of two individuals whom our mission is to save.

The foregoing reflections will, I hope, be sufficient to show that what we are about to say concerning the influence of the pelvic deformities upon the labor is not positive and absolute, but is only applicable to the majority of cases.

Under the head of the difficulties and indications presented by these deformities, we shall admit, with M. P. Dubois, three principal divisions. The first is composed of pelves in which the contraction, in whatever part it may exist, still leaves at that part an opening of at least three and three quarter inches in all its diameters; the second comprises those in which the contraction leaves, at the point of the canal it occupies, a passage, one or more of whose diameters will be three and three-quarter inches as a maximum, and two and a half inches as the minimum; and, lastly, we shall include in the third all the cases where the narrowing is such, that the dimensions of the resulting space will be under two and a half inches.

A. *Of the Pelvis having at least three and three-quarter inches in its Contracted Part.*—Here the labor, although in general longer, more difficult, and therefore more dangerous, both for the mother and child, than in ordinary cases, may, however, be accomplished spontaneously; and, indeed, we might hope for such an expulsion in most cases. The slowness of the labor is observable in the dilatation of the os uteri, as well as in the expulsive

stage; for, during the first stage, the uterine contractions, though energetic and often regular, have but little action on the dilatation of the cervix; the head is high up, and has no tendency to engage in the excavation, and it remains above the symphysis pubis, against which it is strongly applied, being thrown forwards by the prominence of the sacro-vertebral angle Indeed, it is highly probable that the extreme slowness of the dilatation is attributable to this latter circumstance; for the lower front part of the womb is so compressed between the child's head and the pubic symphysis, that the longitudinal fibres of the body can scarcely act at all on the circular ones of the cervix, notwithstanding the energy of their contractions; for we often find, after the size of the head has been diminished by a perforation of the cranium, whereby this compression is relieved, at least in a great measure, that the dilatation that was hitherto stationary now progresses very rapidly.

As to the modifications that take place in the period of expulsion, they vary according to the seat of the contraction; for instance, when the superior strait is the place of the deformity, the engagement of the head might be so much retarded that it could only succeed in clearing this obstacle under the influence of the most powerful contractions; though, should these be sustained, the labor would terminate happily. But if, as is sometimes observed, the corresponding diameter of the inferior strait is simultaneously enlarged, the child's head, after having surmounted the difficulties offered at the upper one, will not find a sufficient degree of resistance at the perineal strait to moderate the rapidity of its descent; and, consequently, it might strike violently against, and lacerate the perineum; the disastrous consequences of which are well known.

Where the superior strait retains its normal dimensions, the inferior one alone being contracted, the head descends rapidly enough into the excavation, but it can only clear the last parts of the canal with the greatest difficulty; for, as the dimensions of the lower strait are in general somewhat smaller than those of the upper, it follows that the same degree of contraction here is much more unfavorable to the delivery, and oftener requires the application of the forceps.

Finally, where the two straits are contracted in the same degree, all the causes of difficulty just mentioned are found conjoined. Most frequently, the head succeeds in passing the superior strait; but, having reached the excavation, and being unable to advance any further, it there remains wedged in until the exhausted or enfeebled forces are sufficiently renovated to effect its delivery. During all this time, the head, which had been forcibly compressed in order to clear the upper strait, and had its dimensions reduced by the overlapping of the parietal bones, gradually regains its natural size, now that it has entered a larger space, departing also from the conical shape it had acquired in the first stage, as its delay there is the more prolonged, and, consequently, meeting with new obstructions at the inferior strait, which are so much the more difficult to overcome as the uterine forces are already the more exhausted.

These differences in the seat of the contraction ought to be known, for they will enable the accoucheur to avoid an error in diagnosis which other-

wise he might very readily commit; for example, in the cases where the superior strait alone is contracted, the head gets into the excavation only after very long-continued pains, but then it clears the inferior one almost immediately afterwards; whereas the contrary happens when this latter is the only one contracted, and the attending physician, judging of the future by the past duration of the labor, announces that it will terminate sooner or later, according as the head has descended more or less rapidly into the excavation; but he will almost always deceive himself; because in the former instance, the termination will be very rapid, though he believed it still distant; and, in the latter, it will be delayed far beyond the time that he had fixed.

B. *Where the Pelvis has at least two and a half inches in its Contracted Part.*—A spontaneous expulsion of the fœtus is still barely possible, where there are from three and one-eighth to three and three-quarter inches in the contracted part; though, in reflecting on the length of the head's smallest diameter, which at term is at least three and one-half inches, it must be evident that, in order to render the delivery practicable under such circumstances, the diameters of the cranial vault should present a great reducibility, and the contractions of the womb be strong and prolonged. But in an immense majority of the cases under three and one-eighth inches, the resources of art become indispensable, unless the child's parts should be softened by putrefaction, or the infant itself not have acquired the development it usually exhibits at the ordinary term of gestation.

C. *Where the Contracted Diameter is less than two and a half inches.*—This degree of contraction renders a natural labor at term physically impossible; because too great a disproportion exists between the dimensions of the canal and those of the body which has to traverse it; and no other alternative remains for the accoucheur than to augment the former by symphyseotomy, or to diminish the latter by embryotomy; unless, indeed, he should rather prefer to open for it a new and more easy route by practising the Cæsarean operation.

M. Depaul, it is true, mentions in his lectures two cases, in which delivery was safely accomplished although the pelvis had only two and a quarter inches in its antero-posterior diameter. They are, however, such rare exceptions that they might be forgotten, so to speak, in ordinary practice. Safe delivery ought not to be counted on with a diameter less than two and five-eighths inches.

As regards the prognosis, it is very important to distinguish a pelvis deformed by rachitis from one whose contraction is dependent on mollities ossium; for although, in the former case, the gravity of the prognosis is only in proportion to the degree of contraction, yet it is not exactly or always so in the latter. Here, indeed, arises the important consideration that the first effect of malacosteon is to produce an excessive softening of the osseous tissue, the deformity of the skeleton being consecutive thereto: but this softening only reaches its *summum* of intensity by degrees, and the disease may be arrested in its progress, may be ameliorated, or even entirely cured, under the influence of a proper treatment. Whence it is evident that during the period of increase and that of its amelioration, which may extend

over several years, the softening passes successively through different degrees and where it happens to exist at the time of labor, furnishes the practitioner a very valuable resource, whatever may be the degree of contraction. In fact, it would appear, from the cases reported in the dissertation of M. Spengel, that the bones often retain, at the time of labor, a sufficient degree of suppleness to enable them to dilate spontaneously, and to allow the expulsion of the fœtus, or, at least, its artificial extraction. Thus, in a case furnished by Homberger, the sacro-pubic diameter was scarcely two inches in length; nevertheless, after having ascertained the flexibility of the bones caused by the malacosteon, he declared that the delivery might be effected by the powers of nature. He ruptured the membranes at the end of twenty-four hours; then, after waiting as much longer; the engagement was sufficiently advanced to enable him to apply the forceps; when, by the aid of powerful tractions, he succeeded in bringing away a girl who lived four weeks. In another woman, whose sacro-pubic diameter was two and a quarter inches (French measurement) at the most, Hasslocher, a physician of Landau, was enabled, by the aid of external pressure, to make the child's head engage in the cavity of the pelvis; he then applied the forceps, and found that only a moderate effort was required to deliver a dead child weighing six pounds and a half.

Kilian mentions other cases of safe delivery during pregnancy, and Dr. Collineau witnessed another, an account of which will be found in his excellent thesis.

Facts of this nature are certainly consolatory, and they well merit attention; but, unfortunately, it is a very difficult matter to recognize that precise degree of flexibility in the bones, under which there is no reason to hope for a spontaneous dilatation; for, between the first stages of softening in them and that advanced period when they scarcely have the consistence of a gelatinous pulp, there are numerous intermediate degrees; and the great difficulty consists in determining the cases in which we can trust to the efforts of nature, and those in which nothing can be hoped from this source. A misplaced confidence might be attended with the most serious consequences; for, on the one hand, a prolonged delay may compromise the child's life, that might have otherwise been saved, by resorting to the Cæsarean operation at the most favorable moment; and on the other, the tentatives uselessly made with the forceps expose the mother to the greatest dangers; for bones affected by this disease are, it is true, most generally softened, but sometimes it happens that the affection has only rendered them more friable, and, of course, any tractions made by the instrument, in such cases, might give rise to dangerous fractures. It would, therefore, be highly desirable to have a rule of procedure, but in the present state of our science it is impossible to lay down any positive one; and the accoucheur must found his opinion on the whole of the phenomena exhibited in the particular case. "Without supposing," says M. Spengel, "that it will be possible to ascertain, positively, to what extent the softening of the pelvic bones has advanced, we believe that, by paying attention to the symptoms which preceded and those that accompany the labor, it may be determined in quite a probable manner. We have collected forty cases of general mollities ossium

that occurred in females; in nineteen of which the time when the pains first began is not noted, and no conclusions therefore can be drawn from them but, in twelve cases, the first pains appeared during the lying-in, in two others, shortly after the accouchement, and in the remaining seven, during the course of gestation; and, whenever the period has been carefully noted when the pains, after having been once calmed, were aggravated anew, it has been found that this exacerbation came on during a new pregnancy. Whence we may suppose that the softening of the bones is more considerable towards the end of gestation than it was before its commencement. Therefore, when the alteration progressively increases until term, and the difficulty in the patient's movements or the pains exhibit no diminution, we believe the degree of softening may be regarded as bearing a relation to the violence and duration of these symptoms. Further, by resorting to the manual exploration, we are enabled to detect in some cases a softening to such an extent that the bones yield to the pressure of the fingers. Under such circumstances the accoucheur may doubtless rely on a spontaneous delivery, or at least on the success of a prudent application of the forceps; which latter should then be made rather than resort to the Cæsarean operation, which is so grave at all times, but is still more so when practised on women affected with malacosteon."

Independently of the difficulties which the contractions of the pelvis give rise to in the accomplishment of the mechanical phenomena of labor, they often become the source of serious accidents to the mother, and subject the fœtus to the greatest dangers. For, by forming an invincible obstacle to the passage of the head, they expose the woman to a rupture of the womb or bladder, to a violent contusion, and the consecutive inflammation of those organs and of the peritoneum, and, lastly, to a febrile or adynamic state, which is serious enough of itself to cause her death before the delivery is effected; since this condition is the most frequent source of mortality in those patients who are not relieved. Again, even where the delivery has taken place either spontaneously or artificially through the natural passages, the duration of the preceding travail and the pressure of the child's head upon all the soft parts lining the straits and excavation, expose these latter to prolonged contusions, which are most frequently followed by gangrene; whence we have following in their train utero-vesical, or vesico-vaginal fistulas, etc., etc., according to the point that has been more particularly compressed. The forced engagement of the head in a contracted pelvis often determines the separation of the symphysis, from which inflammations and suppurations, that are often very tedious in their cure, result as the immediate consequences, and a great mobility of the pelvic articulations, limping, and sometimes even an inability to walk or stand, as the remote ones. (*Lachapelle.*)

As regards the child, the slowness of the labor may evidently occasion its death; for, in the case before us, the head being retained above the superior strait does not prevent the discharge of the amniotic liquid by plugging up the os uteri, and this nearly all escapes; consequently, the fœtus is subjected soon after the membranes give way to the direct pressure of the contracted uterine walls during all the time necessary to the termination of the labor.

The cord also is very frequently compressed, either in the uterine cavity, between its parietes and the body of the child, or subsequently in the excavation into which it may have slipped; the descent of the cord is here singularly favored by the elevation of the head. This latter itself, having to support all the pressure from the resistance offered by the pelvis, is exposed to very unequal compressions, which may fracture the cranial bones or wound the cerebral matter. Lastly, when the fœtus presents by the pelvic extremity, the violent tractions sometimes made on the trunk, for the purpose of disengaging the head, may produce luxation or fracture of the cervical vertebræ or stretching of the spinal marrow, both of which speedily prove fatal.

ARTICLE IV.

DIAGNOSIS OF PELVIC DEFORMITIES.

The circumstances whereby the existence of a deformity of the pelvis may be recognized, have been divided into the *rational* and the *sensible* signs. The first include all those that may be learned from the previous history, and a general examination of the individual — her constitution, height, and physical strength; and the second, on the contrary, are deduced from an external and an internal examination of the pelvis.

§ 1. Rational Signs.

The accoucheur who may be called upon to decide on the good or imperfect conformation of a female, should, before proceeding to an exploration of the pelvis, inform himself minutely of all the antecedent circumstances which might throw any light on his diagnosis, or direct his subsequent researches. He ought to ascertain from the near relatives, all the accidents which the young girl submitted to his care may have met with in infancy: at what age she began to walk; whether standing in the erect position was easy, or even possible, in the early years of life; or whether, after having walked without any marked difficulty, she was subsequently afflicted with a weakness in her lower extremities; and, should there be an existing curvature of the spine or limbs, the period at which such incurvations appeared is to be carefully ascertained; as, also, whether those in the lower extremities preceded or followed that of the spine. Where any limping is observed, he will endeavor to verify the information derived from the family, by examining whether this depends on a difference in the deformity of the two limbs; on the atrophy of one of them; on the flattening of the antero-lateral pelvic walls; on an old or a recent affection of the femoro-coxal articulation; on a spontaneous or a congenital luxation, followed by the permanent displacement of the head of the femur; or whether upon an old and imperfectly consolidated fracture; — because the answer to all these questions will render the examination, which is afterwards to be resorted to, much easier.

[A first general glance will, in the majority of cases, render it possible to establish a differential diagnosis in respect to the two most frequent causes of deformity of the skeleton, in rachitis and flexures of the vertebral column by scoliosis, typhosis, or lordosis.

In a rachitic skeleton, the diminished stature of the individual is due, on the one

hand, to arrested development of the bones, and on the other, to their curvature which is more especially observed in the lower extremities. Hence it results that the skeleton of a rachitic woman has special characteristics. Owing to the curvature of the lower extremities, the pelvis descends with them, and occupies a lower level than it would in the normal condition, and is contracted besides. The vertebral column, though less deformed, appears long in comparison with the inferior extremities. The arms are short, though less on account of their curvature than in consequence of arrested development. We shall see hereafter that the deformities in cases of spinal distentions are of an entirely different character.

Fig. 99. Fig. 100.

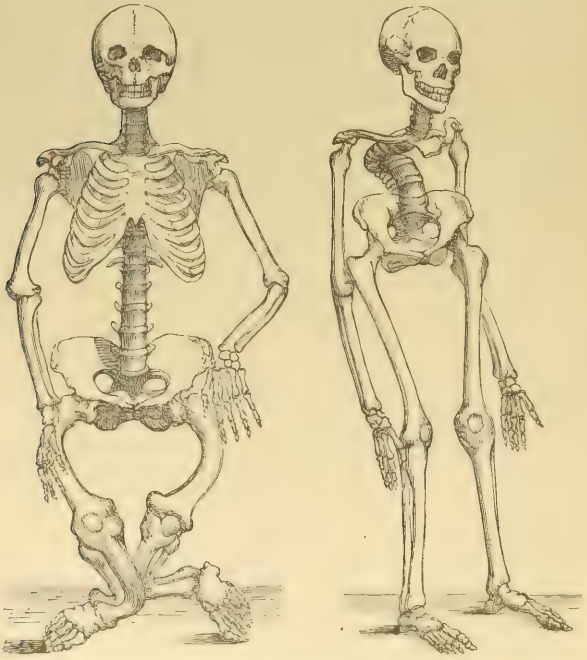


Fig. 99. Skeleton deformed by rachitis. The low stature is due to curvature of the inferior extremities. The pelvis is deformed. Drawn from nature.

Fig. 100. Skeleton deformed in consequence of flexure of the vertebral column. The low stature is due to curvature of the spine. The lower extremities are normal; they look very long. The pelvis is well formed. Drawn from nature.

When deformity of the skeleton is due to curvature of the vertebral column, occurring at the age of puberty, the stature of the individual may be greatly lessened, but then the result is due almost entirely to the affection of the spine, the

lower limbs preserving their usual length and direction. The well-formed pelvis is at the same elevation as in a normal skeleton. The vertebral column, on the contrary, is folded, as it were, upon itself. The upper extremities are well formed but lowered with the upper part of the body, often causing the hands to reach to the lower part of the thighs, or even to the knees.

It is very important not to confound rachitic deformity with distortion of the spinal column by scoliosis, cyphosis, or lordosis. Delivery, in the first case, is often difficult or impossible; in the second, on the contrary, it is almost always easy. (See figures 99 and 100.)]

The history of the earlier years of life is particularly important, as it will not only enable us to divine the perfect or defective conformation of the pelvis with a tolerable degree of certainty, but will even serve to enlighten us as to the nature of the general affection that has produced the deformity. In fact, it would appear from the researches of modern pathologists that rachitis, properly so called, is a disease of childhood, though it is seldom observed in the infant at term; it generally begins about the eighteenth or twentieth month, and is rarely found after the age of puberty. Thus, in three hundred and forty-six cases, examined in this respect by M. Jules Guerin, its invasion took place as follows: in three cases, before birth; in ninety-eight, during the course of the first year; in one hundred and seventy-six, during the second; in thirty-five, in the third; in nineteen, in the fourth; in fifty, in the fifth; and in five children from the sixth to the twelfth year of life.

From these and numerous other cases reported by Bouvier, Ruff, &c., it is apparent that deformities occurring in infancy are nearly always of a rickety nature; whilst all the varieties of softening that take place in adult bones, as also all the disfigurations occurring exclusively in young girls about the period of puberty, are not caused by this disease. (*Guerin.*)

A rachitic origin of the deformity can, therefore, be almost constantly relied on where the disease that determined the latter existed during the early years of life; and this suspicion will be confirmed, if it should appear, conformably to the law laid down by the orthopedists, and stated formally by M. Guerin, that the malformation proceeded from below upwards, and that the tibias, the femurs, and the spinal column were successively affected.

On the other hand, should the first ten years of life pass away without accident, and the deformity of the skeleton occur only at puberty, it would be wrong to attribute it to rachitis, and the pelvis will probably be unaffected.

If, however, the deformity occurs during adult age, especially if the patient has been safely delivered before, and has since that time had all the symptoms of acute softening, the entire difficulty should be attributed to osteomalacia.

After attending to all these points, the accoucheur might proceed to a more careful inspection of the individual; and the vertebral column and lower extremities should particularly claim his attention. He ought to bear in mind that rachitic deviations of the spine and, when dating from early infancy, they will be nearly always rachitic) are almost constantly accompanied by deformity of the pelvis; and that, on the contrary, the other varieties, more especially when they first occurred about the age of

puberty, do not affect the normal regularity of the pelvis. It is also to be remembered that rickets may possibly give rise to curvature of the lower extremities without altering the pelvis, though these two parts of the skeleton are most generally affected at the same time.

In a few rare cases, rachitis affects but one lower extremity, the other retaining its normal proportions, and yet the pelvis may be deformed.

An attempt has been made to establish a certain relation between the direction of the curvature of the spine or lower extremities, and the particular species of malformation the pelvis may exhibit. For instance, the sacrum, being an assemblage of vertebræ, which are naturally consolidated together, is occasionally modified by incurvations that are continuous with those of the spine, and these are further kept up by the coccyx. Sometimes the lateral inflexion of these two bones is continuous with the lumbar curve; though, more frequently, they describe an inverse curvature with one or two of the last lumbar vertebræ, and the point of the coccyx is then turned aside. According to M. Hohl, the lateral inflexion of the lumbar column often determines a greater contraction of the pelvis on the side towards which these vertebræ lean.

Agreeably to the same author, the curvature of the femurs occasions a transverse contraction of the pelvis, and a consequent elongation antero-posteriorly, when these bones are curved forward; whilst their outward curvature is followed by a transverse enlargement; but if one bends outward and the other forward, a corresponding shortening will thence result in the latter direction. However, all these approximations must be substantiated by a more extended experience to render them deserving of confidence, although it would be improper in practice to neglect them altogether.

The relations that M. Weber has endeavored to establish between the dimensions of the cranium and those of the pelvis are not constant enough to merit any consideration whatever in an examination which requires so much precision.

Quite recently, M. Guerin, after having ascertained that rachitis proceeds from below upwards, and that the reduction in the dimensions of the bones follows the same progression, attempts to prove further that the dimensions of a rickety bone being known, the size of other parts of the skeleton may be approximately determined; and that the reduction in the three diameters of the pelvis in rachitic women follows the diminution in the size of its component parts; also that the degree of this reduction is intermediate to what takes place in the femur and in the humerus.

These results, so valuable in themselves, had they been deduced from a large number of cases, are, unfortunately, based upon a very limited observation; and, consequently, have not all the weight that I hope they will hereafter acquire; for the great importance of being able to determine, with certainty, from the degree of shortening of the femur and humerus, not only that the pelvis is deformed, but even the extent of the malformation must be self-evident.

In conclusion, it is apparent that the rational signs just spoken of can only give us probabilities or approximations. Now, the indications presented by the deformities of the pelvis demand an exact and a rigorous

solution of all the questions of diagnosis appertaining thereto; because it is not on a mere probability that an accoucheur can venture to prohibit a young girl from marriage, or decide on the performance of an operation that mutilates the child, or exposes the mother to the most serious dangers Such a decision can only be made after a thorough and minute examination of the external form, and the internal dimensions of the pelvis; and this examination alone can enable him to detect those sensible signs which afford a positive certainty.

§ 2. Sensible Signs.

The accoucheur should not content himself, therefore, with the foregoing characters, but he ought to seek, in the mensuration of the pelvis, for the elements necessary to his diagnosis. This process is performed both on the exterior and interior of the pelvis; in the former case it constitutes what obstetricians have termed *external*, and in the latter, *internal pelvimetry*.

When we described the pelvis, in the early part of the work, we only pointed out the dimensions that were absolutely necessary to the full comprehension of the mechanism of natural labor; but we must now supply that voluntary omission; for, in addition to the distances then given, there are several others which are indispensable to the practice of pelvic mensuration; and we give the following as the average of a well-formed pelvis, viz.:

1. From the anterior inferior spinous process of one ilium to the same point on the opposite side, ... 8½ inches.
2. From the anterior superior spinous process of one side to the same point on the other, ... 9½ "
3. From the middle of the iliac crest of one side to the same point opposite, ... 10½ "
4. From the middle of the iliac crest to the tuber ischii, . . 7½ "
   The superior strait divides this distance into two equal parts, whence the lateral portions of the greater or lesser pelvis are each . . . . . 3¾ "
5. From the anterior superior part of the symphysis pubis to the apex of the first spinous process of the sacrum, ... 7½ "
   From which 2½ inches are to be deducted for the thickness of the base of the sacrum, and ½ an inch for that of the symphysis; therefore leaving for the sacro-pubic interval . . . . 4½ "
6. From the tuber ischii of one side to the posterior superior spinous process of the opposite ilium, the mean extent, in an ordinary pelvis, is . . . . . 7 "
7. From the anterior superior spine on one side to the posterior superior spine of the other, the mean is . . . . . 8¼ "
8. From the spinous process of the last lumbar vertebra to the anterior superior spine of either side, the mean is . . . 7 "
9. From the trochanter major of one side to the posterior superior spinous process of the opposite one, ... 9 "
10.[1] From the middle of the lower border of the symphysis pubis to the posterior superior spinous process on either side, . . 6¼ "

[1] The last five measurements are taken from the Memoirs of M. Naegèle, translated by M. Danyau. We shall hereafter revert to their importance, in connection with the diagnosis of the oblique-oval pelvis.

For the purpose of ascertaining the dimensions just given, in the living female, as well as the principal modifications they may have undergone, accoucheurs have invented a great number of instruments, to which the title of *pelvimeters* has been applied; but I can only allude here to those in most common use.

Fig. 101.

Baudelocque's callipers applied to the measurement of the antero-posterior diameter of the superior strait.

The pelvimeter, or callipers, described by Baudelocque (Fig. 101), consists of two metallic blades bent in a semicircular form, so as to embrace the largest part of the pelvis in their concavity. The extremity of each one is terminated by a lenticular button, which is intended to be applied at the end of the line to be measured; a small rule, marked by a graduated scale, traverses the branches just at the point where the curved blade joins the straight handle, and shows the degree of separation at the points exactly. This rule shuts up in a deep groove along the handle of the callipers. The instrument is applied externally, and may prove very useful in estimating the measurements above given.

In skilful hands, the pelvimeter of Baudelocque may furnish very satisfactory results; but it must be acknowledged that it is far from affording the degree of certainty which its inventor anticipated, even in the determination of the antero-posterior diameter of the superior strait, the one, of all the pelvic diameters, which seems the best adapted to this mode of exploration; for, although one of the buttons can readily be applied at the upper front part of the pubic symphysis, after having carefully pushed aside the soft parts, yet it is far otherwise with regard to placing the other one just over the point corresponding to the spinous process of the first piece of the sacrum.[1] The difficulty of determining this latter point exactly, and the thickness of the soft parts, render this mode of mensuration very uncertain in its results. But, even supposing the instrument could be properly adjusted, the results thereby obtained would be scarcely more conclusive. When the pelvis is well formed, there should be, it is said, seven and a half inches between those two points; from which two and a half inches for the thickness of the sacrum at its base, and half an inch for that of the symphysis pubis, are to be deducted. But, the question at once arises, are the pelvic bones always uniform in thickness? or must we still deduct three inches for the substance of the bones, in cases of rachitis, where the skeleton

[1] I have repeatedly made such attempts, and have so rarely succeeded in adjusting the point of the callipers over the spot behind where it is directed to be applied, that I have rather attributed those cases to chance, in which the touch did not set aside my first diagnosis; and I will add, further, that I have often known M. P. Dubois to abandon this mode of exploration after frequent ineffectual trials, and to rely wholly upon the vaginal examination

exhibits a more or less marked arrest in its development? How are we to know to what extent this influence of rachitis over the growth of the osseous system is carried? And may not the thickness of the sacrum at its base, instead of exhibiting the normal average of three inches, be reduced to two, one and a half, or even one inch?[1]

If such sources of uncertainty exist in respect to the measurement of the sacro-pubic diameter, what must it be with regard to determining the transverse or oblique ones by the pelvimeter? For, is the interval between the anterior iliac spines always the same? In the normal state, that extending from the middle of the iliac crest on one side to the same point opposite is ten and a half inches, just double the length of the transverse diameter of the superior strait: but it is well known the iliac fosse may vary in their concavity, and that the crests may approach more or less closely towards a vertical or a horizontal direction, without altering the form of the abdominal strait. Therefore, the supposed relations between these two distances exhibit such frequent anomalies that we cannot place any confidence in the conclusions endeavored to be established therefrom.

Again, where one point of the callipers is placed on the external surface of the trochanter major, and the other on the salient part of the opposite sacro-iliac articulation, with a view of determining the oblique diameters, no account is made of the numerous variations in the length and inclination of the cervix femoris, in the depth of the cotyloid cavity, or in the thickness of the soft parts behind.

Consequently, the employment of Baudelocque's pelvimeter can only give approximate results; but it is not the less a useful instrument in those cases where it would be impossible to introduce a foreign body into the vaginal cavity; for instance, the internal exploration is not permissible in young girls, and then we must resort to the use of the callipers. Fortunately, at such times, the diagnosis need not be very precise, and a few lines more or less cannot affect the decision of the physician.

[1] We have had opportunities of measuring a great number of pelves that were deformed in various ways and in different degrees, says Madame Boivin, in which the thickness of the walls in question departed from the three inches assigned to them by Baudelocque, to the extent of a third of an inch to an inch each, either larger or smaller. This difference in thickness was sometimes observed in the pubis, at others in the base of the sacrum, and again in both of these bones at the same time. Besides, in more than a hundred well-formed pelves, covered by all their tissues, which had not been altered by disease in any way, we have noticed considerable variations both in the volume and the thickness of the parts forming the antero-posterior diameter at the superior strait.

Madame Lachapelle has found the sacrum alone nearly three inches thick, in many well-formed pelves, whilst in some deformed ones it scarcely measured two inches.

"I consider the results," adds this skilful midwife, "that are obtained in measuring the transverse and oblique diameters of the strait, by taking certain portions of the iliac crests, the great trochanters, the ischial tuberosities, &c., for the points of departure, as very fallacious: Because, 1. In the best-formed women, the iliac crests are sometimes inclined towards each other, and at others are turned outwards, so that both an everted and a reversed variety may exist in natural pelves. 2. The great trochanters are more or less separated according to the variable direction and length of the neck of the femur, &c."

But the case is far different when the woman is pregnant or in labor, for then it is necessary to learn the dimensions of the pelvic cavity with the greatest exactitude. For this purpose, accoucheurs have devised various instruments, which they have designated by the title of *internal pelvimeters*.

The most ancient of all is the one invented by Coutouly, which closely resembles, in its general appearance, the instrument used by shoemakers, some years since, for taking the measure of the foot; it is composed of two iron rules, which slide on each other, and each having a short plate fixed at a right angle on one of its extremities. When it is introduced into the vagina, the two rules are slipped along each other, so as to get one of the plates against the sacro-vertebral angle, and the other just behind the posterior face of the symphysis pubis. One of these rules is marked by a scale, which indicates the degree of separation of the two plates, and, consequently, the length of the sacro-pubic diameter.

The use of this instrument is attended with such numerous inconveniences as to have banished it almost entirely from practice. Its application is difficult; it distends the vaginal mucous membrane greatly, and this distention is often very distressing to the patient. The extremity of the plate that is intended to be applied on the sacro-vertebral angle, is liable to slip and to become displaced; beside which, the organs situated in the excavation oppose its free use.

Madame Boivin endeavored to obviate most of the objections against Coutouly's instrument, by substituting a new one, which she called an *intro-pelvimeter;* which, although bearing a general resemblance to the former, differs essentially, in having its two constituent branches simply articulated, so that they may be unfastened and introduced separately; the one into the rectum, the plate of which is to be applied against the sacro-vertebral angle, and the other into the vagina, so as to place its vertical part behind the symphysis pubis. This instrument is perhaps less painful to the patient, and not so liable to be displaced as the other, but it will not furnish us any more accurate results. Besides, the introduction of a foreign body into the rectum is so disagreeable to most women that very few are willing to submit to it; for where, indeed, is the young girl (and Madame Boivin recommends it particularly for virgins) who would ever consent to its employment?

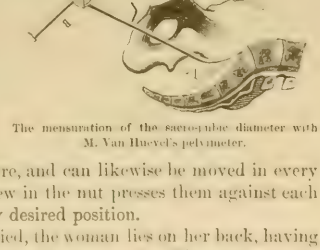
But it is unnecessary to allude here to all the other pelvimeters that have been proposed, and I shall only bring forward the one invented by Stein, which I should adopt rather than the preceding, because it is more simple and more easily applied. It is merely a metallic stem, of the length and size of the female catheter, provided with a slide, and having the metrical divisions marked on one of its surfaces. It is employed by passing its extremity along the forefinger, previously introduced into the vagina, until it reaches the sacro-vertebral angle; the external part is next pressed upwards, so as to bring the graduated face in contact with the lower portion of the symphysis pubis, and then, by means of the slide, the point on the stem corresponding to the symphysis is marked. The instrument is subsequently withdrawn, and all that part of it beyond the slide shows the length of the sacro pubic diameter, or rather the interval existing between the sacro-vertebral angle and the inferior part of the pubis.

However, Stein's pelvimeter may be replaced by any straight rod whatever, upon which the finger will take the place of the slide.

Many very ingenious instruments have been proposed during the last few years, for the purpose of obviating the various objections we have urged against those just mentioned; such are Wellenbergh's, a description of which is given by M. P. Dubois in the twenty-third volume of the new edition of the *Dictionnaire;* and, more particularly, the one announced quite recently by M. Van Huevel, a professor at Brussels. This latter, in my estimation, has incontestable advantages over all the others; and I feel warranted in recommending its more general use.

It is composed of two round rods; an *internal* or vaginal one (Fig. 102, A A), flattened like a spatula at each extremity, and having, about the middle of its upper face, a small blunt hook, or catch, the concavity of which looks towards the outer extremity; the other, or *external* one, B B, is traversed at the upper end, and perpendicularly to its direction, by a long screw, C, which is drawn back by unscrewing. These rods are held together by means of a nut, or articular box, thereby forming a kind of compass, the legs of which can be lengthened out or shortened at pleasure, and can likewise be moved in every direction. A turn of the central screw in the nut presses them against each other, and retains them firmly in any desired position.

Fig. 102.

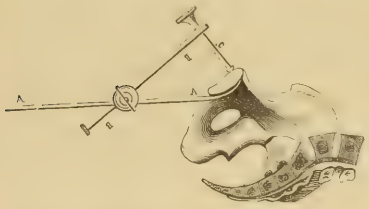


The mensuration of the sacro-pubic diameter with M. Van Huevel's pelvimeter.

When this instrument is to be applied, the woman lies on her back, having the legs, as well as the thighs, flexed and separated. We then begin by ascertaining, both exteriorly and interiorly, the exact situation of the upper border of the pubis, marking the skin with ink at the point corresponding to the middle thereof. The ilio-pectineal eminence on each side, just beyond the course of the crural artery, is next sought out and marked in the same way; so that the anterior extremities of the sacro-pubic and the two oblique diameters of the superior strait are indicated by the three ink-spots on the skin, which are afterwards easily found. This being done, one or two fingers of the left hand are introduced into the vagina, and placed on the angle of the sacrum; and then, with the other, the curved extremity of the vaginal rod is conducted along and under these fingers, which support it against the promontory, while the thumb of the same hand, pressed into the blunt hook, firmly retains it on the exterior. The right hand, which hitherto held the instrument, now turns the long screw, C, in the external branch, the button of which rests on the ink-spot made upon the mons veneris. While the operator thus holds the two branches in their respective positions, an assistant tightens the screw in the articular nut; when the instrument, being thus fastened, is carefully withdrawn (Fig. 102), and the distance between the two points, that is to say, the interval which separates the promontory from the anterior face of the pubis, is ascertained by a scale. This distance

being known, the branches are rendered movable by unfastening the articular screw; and the operator again carries the left forefinger into the vagina behind the symphysis pubis, to which point he conducts the extremity of the vaginal branch (its concavity being in front), by slipping it along the palmar surface of this finger, and he sustains it there by one hand, whilst with the other he replaces the screw of the external branch upon the ink-spot on the mons veneris; taking care to avoid pressing more firmly than in the first operation; for it is only requisite to graze the skin without depressing it. The assistant again tightens the screw in the nut, and the operation is completed. (Fig. 103.)[1]

Fig. 103.



The mensuration of the symphysis pubis by the same instrument.

In order to withdraw the instrument, which now comprises the thickness of the pubic region, the screw c of the external branch is unfastened, and again exactly replaced in the same position after it is withdrawn. This distance is also measured, which, deducted from the first, gives a remainder that extends from the sacro-vertebral angle to the posterior face of the pubis, or, more properly speaking, the sacro-pubic diameter.

The oblique diameters can be obtained precisely in the same way. The index and middle fingers are carried into the vagina, and their extremities placed on one of the sacro-iliac articulations, or even, if this cannot be reached, on the promontory of the sacrum; the end of the vaginal branch is slipped up there in turn, and then the button of the screw c is fixed on the ink-spot corresponding to the right or the left ilio-pectineal eminence. The branches having been fastened in this position, are gently withdrawn from the woman's parts, and the distance between their points is taken by a graduated scale. In a second operation, the thickness of the cotyloid wall is ascertained by conducting the vaginal branch along the fingers behind this cavity, as far as the brim of the pelvis, and by replacing the button of the external branch over the ink-spot corresponding to the ilio-pectineal eminence. Is it necessary to repeat, that the soft parts in the groin are not to be depressed, and that the direction must correspond with the plane of the abdominal strait? The branches are subsequently fixed, and extracted by turning back the screw c, as described above; when, by deducting this second thickness from the first, the remainder will show the extent either of the oblique diameter, or that of the sacro-cotyloid interval, according as the vaginal branch had originally been placed on the sacro-iliac symphysis or upon the promontory of the sacrum.

We may observe here that the opening between the promontory and the

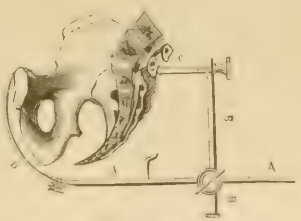
[1] If the hook should impede the sliding of the branch B B, it might be removed.

cotyloid wall is the most essential to be known in cases of oblique deformity; for the sacro-iliac articulation is never deformed (saving where an exostosis or some other tumor is developed on its surface); but it is rather the base of the sacrum, or the cotyloid cavities which project into the hollow of the excavation. In fact, the pelvis sustains the vertebral column behind, while in front and laterally it rests on the thigh bones; and, therefore, it lies between two forces, which, in the erect position and in walking, have a continual tendency to depress this osseous ring at the three points indicated. Whence it follows that, if there is any softening, there will be a forward projection of the sacral angle, or a pressing backward of the acetabula; that is to say, a contraction of the antero-posterior diameter, and of the right and left sacro-cotyloid intervals, which, in the normal state, are only from three to three and three-quarter inches in extent.

As regards the external measurement, we can convert the pelvimeter into a common compass for the inferior strait, by taking the handle part of the two branches, and properly adjusting the nut; these being placed on the tuberosities of the ischia, or one at the point of the coccyx, and the other under the pubic arch, we are enabled to take the transverse and the antero-posterior diameters of this strait directly.

Lastly, by adding a piece to the apex of the vaginal branch (Fig. 104, D D), we form a species of callipers similar to the mecometer of Chaussier. This piece is first flattened out like a spatula, and then curved; and its concavity is placed along the anterior surface of the pubis; the branch that supports it passes backwards between the woman's thighs; and the button of the screw C, traversing the other branch, is pressed on the spinous process of the last lumbar vertebra.[1] The operator holds the extremities of the instrument in his two hands, whilst an assistant tightens the screw in the articular nut. It is disengaged by turning the screw C backwards, when necessary, which is returned to its place before measuring the interval between the points with the scale. (Extract from the *Memoir of M. Van Huevel.*)

Fig. 104.



The same instrument converted into a pair of callipers.

[1] If, says M. Van Huevel, the tubercle of the spinous process of the last lumbar vertebra cannot be detected, the following process may be had recourse to: Stretch across this region a string which shall rest upon the upper and middle part of the crests of both iliac bones; then, at the distance of an inch and a half below this line, upon the middle of the sacrum, make a mark, from which the string is to be conducted obliquely forward and downward toward the upper part of the cotyloid parietes and of the mons veneris. The position of the string, which should follow the inclined direction of the plane of the superior strait, may be rectified, if necessary, by the fingers. Then, with an uncut quill dipped in ink, the points to be preserved are marked out along the line of the cord. These points should be made lower at the pectineal eminences and at the pubis, by from one and a half to two and a half inches, than the described limit, in order to correspond better with the contraction of this strait.

In February, 1855, the ingenious accoucheur of Brussels improved his first pelvimeters, besides suggesting another, which appears to me quite as simple, and of more general applicability than the preceding. I therefore think it right to give a detailed description of it.

It is simply a pair of callipers (Fig. 105) composed of two branches, one

Fig. 105.

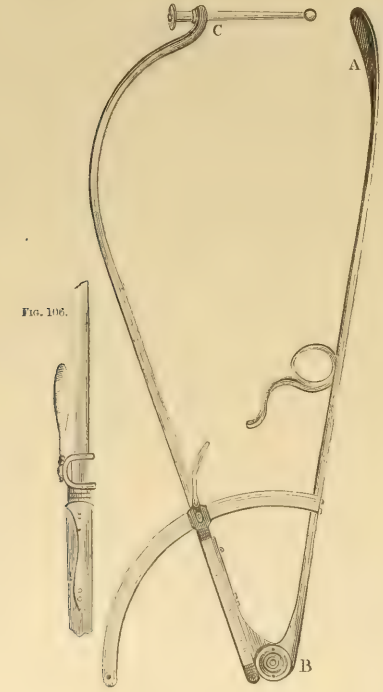
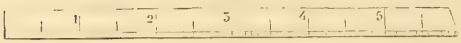


Fig. 106.

Fig. 107.



of which is fixed, and the other movable. The first, A B, is eleven inches in length, slightly curved, and flattened at its extremity; it is inserted into the vagina for the internal measurement, and bears a hooked ring near its middle, beyond which is a non-graduated arc of a circle. It articulates

below, like an ordinary pair of compasses, with the prolongation of a sheath, in which is inserted the lower extremity of the other branch. The curvature, length, and hooked ring, are the same as in the small geometric pelvimeter.

The second or external branch, C B, may be lengthened or shortened at pleasure. It carries at its upper extremity a long horizontal screw, like the preceding pelvimeter, for the purpose of facilitating the disengagement of the compass after its internal application: from thence it curves outwardly, and, finally, in descending becomes straight and quadrangular, and enters the above-mentioned sheath. The latter, which is open at both ends, is furnished with a groove externally, for the purpose of receiving a projection of the branch, which prevents its escaping from the sheath. Its inner side is provided with a spring bearing a point, which passes through the side, and lodges in a small hole in the branch, so as to prevent the latter from slipping up and down, and to keep the two extremities of the branches on the same level. When the spring is raised, the point escapes from the hole in the stem, which then becomes movable; when released, and pressing upon its surface, it keeps it at any height desired.

The arc of a circle attached to the vaginal branch is applied against the right side of the external branch. A slide (Fig. 106) is traversed by the latter at right angles, and also by the arc. On the opposite side is fixed a vice, moved by a lever, which presses these two pieces together, and prevents all motion. Lastly, a graduated scale (Fig. 107) serves to measure the distance between the extremities in any given position.

Let us now examine the mode of application of the new pelvimeter.

The compressing vice of the slide is relaxed, and the point of the spring engaged in the small hole of the external branch keeps the extremities of the instrument on the same level, so as to form a pair of callipers. The extremities are applied either to the anterior superior spinous processes of the iliac bones, to the crest of the ilium and the tuberosity of the ischium of the same side, or the bottom of the horizontal screw is placed upon the spinous process of the last lumbar vertebra, and the extremity of the vaginal branch against the mons veneris by passing between the thighs of the patient; again, one may be applied to the upper, and the other to the lower edge of the pubis, to the tuberosity of each ischium, or, finally, upon the coccyx, and under the pubic arch.

Thus are obtained the extent of the transverse diameter of the greater pelvis, the depth of the entire cavity, the distance from the loins to the pubis, the length of the symphysis pubis, and the transverse and antero-posterior diameters of the inferior strait, the value of each of which is determined by the scale.

To measure the interior of the pelvis, the woman is placed on her back on the bed, with the breech brought to the edge of the mattress. The extremities of the diameters of the superior strait are marked in the manner already described, with the aid of a cord and a quill. Then, one or two fingers of the left hand are introduced into the vagina as far as the promontory of the sacrum. The right hand holds the callipers unfastened and opened to its full extent, and with the external branch depressed in its sheath. The

extremity of the vaginal branch is next passed into the genital organs along the previously introduced fingers, which press it against the sacro-vertebral angle, whilst the base of the thumb engages itself in the hook. The instrument is held motionless in its position by a single hand. Then, the thumb, fore, and middle fingers of the right hand grasp the external branch above the arc of a circle, and raise or lower it in its sheath until the button of the horizontal screw corresponds to the mark made upon the mons veneris. As soon as this is effected by *merely grazing the skin*, the ring-finger presses the lever of the vice forwards, to fix the instrument in its place. It is then withdrawn from the woman's parts, and the distance between the two extremities ascertained by means of the scale.

The first stage of the operation being accomplished, the vice is relaxed, and the extremities of the callipers again made to correspond. The index finger of the left hand is again introduced into the vagina, and applied this time behind the pubis. The extremity of the vaginal branch is conducted thither, with its concavity in front, by the right hand. As soon as it has reached the upper edge of the symphysis, the branch is seized with the entire hand, and the little finger passed into the ring of the hook. The external branch is afterward seized above the arc by the three first fingers of the right hand, and the ring-finger pushes the lever of the vice forward, as soon as the button of the horizontal screw corresponds to the spot on the mons veneris. This second application should be made as gently as the first, merely *grazing the skin*. Should any difficulty be experienced in the withdrawal of the pelvimeter, the horizontal screw may be screwed back, provided it be restored to its position after the extraction. The distance between the extremities should be again measured by the scale, and subtracted from the first result, to obtain the extent of the sacro-pubic diameter.

The only error possible in this process results from the unequal pressure upon the skin in the two applications, or else upon the irregular position of the branch behind the pubis, which may be either higher or lower than the sacro-pubic line itself. A little attention only is necessary in order to avoid these slight causes of error.

The proceeding is exactly the same for obtaining the oblique diameters. The pelvimeter is first loosened, opened widely, and the external branch lowered in its sheath. If the left sacro-pubic space is to be measured, the instrument should again be taken in the right hand; the fore and middle fingers of the other hand are introduced into the genital organs, and placed to the left of the pre-vertebral projection; then the extremity of the vaginal branch is passed up to the point indicated, and retained there by the fingers of the right hand, the button of the external branch is placed upon the mark over the left ilio-pectineal eminence, and the vice is tightened by the ring-finger. The instrument, in its diagonal position, is withdrawn from the parts, and the distance between the two extremities ascertained by the scale.

Having noted the latter, the vice is unfastened, and the two extremities of the callipers brought together. Then the fore and middle fingers of the left hand are again introduced into the vagina behind the left ilio-pectineal eminence, as also the extremity of the vaginal branch with its concavity

forward; the branch is next grasped with the left hand, and the little finger introduced at the same time into the ring of the hook. The thumb, fore, and middle fingers of the right hand replace the button of the external branch upon the mark over the left ilio-pectineal eminence, whilst the ring-finger presses upon the lever of the vice. The same precaution should be taken, as in the first instance, of turning the horizontal screw, if necessary, in order to withdraw the instrument, and to return it to its place, for the purpose of measuring the new distance between the extremities. The subtraction of this quantity from the other gives the dimensions required.

The right sacro-pectineal distance is ascertained in the same way, except that the fingers of the right hand are then introduced into the vagina, the instrument being held in the left hand.

Finally, the measurement of the transverse diameter of the superior strait is accomplished in nearly the same manner. The callipers being prepared as usual and held in the right hand, two fingers of the left hand in a state of forced supination, the thumb being directed downwards, are carried to the right side of the pelvis. The convexity of the vaginal branch is directed toward that point, and held there by the pressure of the introduced fingers, and by the left thumb, which is engaged in the hook. The free hand conducts the external branch beneath the left thigh, which is raised for the purpose, and places it upon the mark made upon the corresponding hip. The ring-finger of the right hand fixes the instrument in its transverse position by pressing upon the lever of the vice, and the distance between the extremities is measured by the scale after the extraction.

To make the second application, the vice is relaxed, and the external branch elongated beyond the extremity of the vaginal one; then, the fore and middle fingers of the left hand are placed in the genital organs on the left side of the pelvis. The extremity of the vaginal branch is conducted thither by the right hand, and kept there by the left hand, the little finger of which is inserted in the ring of the hook. The external branch is finally directed by the free hand beneath the left thigh upon the hip of the same side, and fixed as usual. The horizontal screw is next turned for the purpose of withdrawing the pelvimeter. When restored to its place, the distance between the extremities is again taken, and this, subtracted from the first measurement, gives the length of the transverse diameter.

The diameters of the excavation may be measured in the same manner; it being only necessary to take the precaution to mark spots around the pelvis between the limits of the superior and inferior straits.

But, after all, the hand of an accoucheur, accustomed to practise the touch, is certainly the best and most satisfactory of all pelvimeters; for, with the exception of a few rare cases, in which I would give the preference to the instrument last described, it is always possible to ascertain exactly by it the external form of the pelvis, and also, by its introduction into the vagina, the perfect or defective conformation of the cavity.

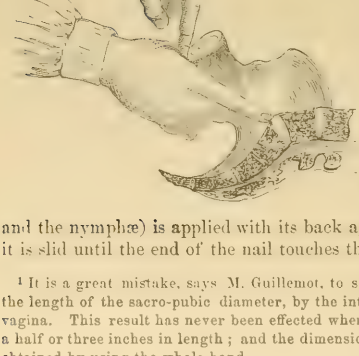
By the exterior palpation, we are enabled to learn the external characters of the pelvis, to find out what interval exists between the two iliac crests, and to measure the depth of the anterior, the posterior, and the lateral walls of the pelvis; and this might possibly be all-sufficient; although, in our

opinion, it is better to resort to the callipers of Baudelocque for the external mensuration.

It is more particularly in the appreciation of the dimensions of the cavity, the straits, and the excavation, that the hand introduced into the parts serves as a sure and faithful guide. It is not even necessary to pass the whole hand into the vagina, for the introduction of one or two fingers is usually quite sufficient; in fact, we ought to be satisfied with this, when the woman is not in labor, since the entrance of the entire hand would often prove very painful.[1]

The following is the proper mode of using the finger: the index having been passed into the vagina, is directed upwards and backwards towards the sacro-vertebral angle, which is easly recognized by its prominence, and by the transverse depression formed at the lumbo-sacral articulation. When the extremity of the finger is well applied against this part, the wrist is carried upward and forward, until the radial border of the finger comes into contact with the lower margin of the symphysis pubis (see Fig 108), when the index of the other hand (the precaution having previously been taken to separate the labia externa and the nymphæ) is applied with its back against the vestibule upon which it is slid until the end of the nail touches the finger in the vagina. The two

Fig. 108.



[1] It is a great mistake, says M. Guillemot, to suppose that it is possible to measure the length of the sacro-pubic diameter, by the introduction of a single finger into the vagina. This result has never been effected when the diameter has exceeded two and a half or three inches in length; and the dimensions of the strait can only be correctly obtained by using the whole hand.

Like M. Guillemot, we believe that the hand should be introduced, whenever it can be done without causing too much suffering to the patient; but we have elsewhere stated that it was often very painful, even at the moment of labor; and we will add, that at any other period it would appear useless, since the finger alone, by depressing the perineum, might measure as far as three and a half inches, unless there was an unusual resistance at this part, and beyond this a natural delivery is possible; or, at least, if the intervention of art should become necessary, it could always be terminated favorably to the lives both of the mother and child; and, therefore, nothing need be done until the time of parturition.

During labor, says M. Velpeau, we can, if necessary, introduce the entire hand into the vagina; the thumb and index finger are then separated, so as to place the one on the sacro-vertebral angle, and the other behind the pubis; the hand is withdrawn while in this position, and, by the aid of a measure, the dimensions of the sacro-pubic diameter are determined with one or two lines. I have sometimes used the index and middle fingers, carried high up into the vagina, with advantage; and then, after having separated them as much as possible, and placed their extremities on the diameter that is to be measured, two fingers of the other hand are inserted between their

fingers should come together precisely at the lower edge of the symphysis pubis. Pressure with the nail will make a sufficient mark upon the finger of the right hand. The latter finger is then to be withdrawn and applied to a rule. In this way the distance between the sacro-vertebral angle upon which the end of the finger rested and the lower edge of the symphysis pubis is very readily determined. But this oblique line is longer than the antero-posterior diameter of the upper strait, which terminates in front, on the posterior superior part of the symphysis; consequently the excess must be deducted; and, by subtracting four or five lines for a large pelvis, and three to four for a small one, we shall have very nearly the extent of the sacro-pubic interval. With regard to the exact number of lines to be deducted, the attention should further be directed to the thickness, the length, and the more or less marked obliquity of the symphysis; which circumstances can easily be determined by the touch.

Of all the methods, measurement by the finger gives the best results; but it should be done carefully, and precisely in the manner described above. If the separation of the greater and lesser labia be neglected, or if the nail be not applied accurately against the lower part of the symphysis, the measurement obtained will necessarily be inaccurate.

The finger introduced into the parts will also be able to appreciate the extent of the antero-posterior diameter of the excavation; for it can very readily pass over the whole front surface of the sacrum; and, consequently, can judge whether its anterior concavity is augmented or diminished.

Lastly, its extremity being applied against the point of the coccyx, the accoucheur should again elevate his wrist until the radial border of the hand is arrested by the lower part of the symphysis; then, marking this point with the other forefinger, he should withdraw the hand and apply it to a graduated scale, and he can thus ascertain very correctly the extent of the coccy-pubic diameter; further, by pressing gently on the point of this bone, he can judge very readily of the degree of mobility in the sacro-coccygeal articulation. In cases of deformity caused by the excessive length or unusual obliquity of the pubic symphysis, the direction of the vulvar opening will be so much changed as to attract attention; it being then situated much more posteriorly than in well-formed women.

Although the results furnished by the touch are perfectly satisfactory as regards the antero-posterior diameters, it is far otherwise with the transverse and oblique ones, particularly at the superior strait; for the extent of these

bases, to prevent them from changing their relations while being withdrawn from the woman's parts. But these directions, given by M. Velpeau, appear to us impracticable at the superior strait, and equally so as regards the bis-ischiatic interval.

Ramsbotham's process resembles nearly Velpeau's. He introduces the fore and middle fingers into the excavation; the bent extremity of the forefinger is applied closely against the symphysis pubis and the end of the strongly-extended middle finger endeavors to reach the sacro-vertebral angle; then withdrawing *the fingers in the same position*, the space between their extremities is, he says, to be measured by a rule or a pair of compasses. He states that this process has the advantage of giving the exact dimensions, even when the head is engaged in the excavation, since one finger can be passed behind it and the other before it. (*Obstetric Med. and Surg.*, p. 18.) We consider this procedure quite as unavailable as that recommended by M. Velpeau

can only be judged of approximately, and we can do nothing more than test with the finger the dimensions obtained by the external mensuration. The finger, when entered, is to be carried in the direction of those diameters, and the accuracy of the result thereby obtained will depend on the experience and tact of the accoucheur. However, we shall soon have occasion to be more explicit on this point, by extracting from the works of MM. Nægèle and Danyau the results of their researches.

As to the transverse diameters of the inferior strait, their dimensions can evidently be ascertained by the aid of the fingers.

Again, the educated finger will give a very just idea of the length of the symphysis pubis, the spreading and height of the pubic arch, the depth and normal configuration or deviation in the lateral walls of the excavation, and of the inward prominence of the ischiatic spine.

The existence of the various tumors that may obstruct the pelvic cavity, or greatly diminish the canal intended for the passage of the child, can be recognized by the finger alone; for it can detect their nature, their softness, or resistance, and their mobility, or adhesion to the osseous parietes, or to the soft parts which line the latter, far better than any other instrument. But during parturition, the touch, which is so often useful at other times, may not prove adequate to this measurement; for, if the contraction is not very extensive, the head, after being arrested for a long time, may finally engage at the upper part of the excavation, and form a considerable rounded tumor just below the superior strait, large enough to prevent the finger from passing up to the sacro-vertebral angle; and if the sacrum should then happen to be strongly pressed backwards, as is most commonly the case, so that the antero-posterior diameters of the excavation and of the inferior strait are increased, the cause of the head's arrest might be misunderstood, if the accoucheur does not bear in mind that, before engaging, it remained for some time above the symphysis pubis. The attention, however, will be awakened, if the finger, in traversing the anterior surface of the sacrum from above downward, detects the absence of its normal curvature. The sacro-vertebral angle may, however, be reached quite frequently by passing the finger around the head; but the tumor formed by the œdematous scalp sometimes projects so far into the cavity of the pelvis, as to render it impossible to measure a straight line from the promontory to the lower part of the pubis.

We repeat, that the accoucheur's finger is the most perfect of all instruments, though its importance must not be overrated. In fact, many practitioners have erred in declaring, with Madame Lachapelle, that the best proof of a good conformation of the pelvis is the impossibility of reaching the sacro-vertebral angle with the finger. Certain others, while admitting the imperfection of the other methods of exploration, equally err in supposing that an estimate, correct enough to guide us safely in practice, will be obtained by employing them simultaneously; because, there are some cases where the best known methods of exploration are inadequate, where the finger cannot reach the promontory of the sacrum, and yet where a mutilation of the fœtus, and sometimes even the Cæsarean operation, have been necessary.

The oblique oval pelvis belongs to this class; and M. Nægèle, who described it with so much care, after having experienced the inefficiency of the means of diagnosis usually employed, has made some researches, with the view of overcoming this difficulty; for which purpose he has taken points on the pelvis different from those described by most authors, which are easily accessible and recognizable; and he has carefully measured the distances between them in the normal state, as already pointed out (page 653, Nos. 6, 7, 8, 9, and 10). "In forty-two pelves of well-formed females, we have found," says he, "in a large majority of cases, but little or no difference between the two sides of the same pelvis, as respects the above-mentioned distances." M. Danyau, responding to the wish expressed by M. Nægèle, has repeated those researches in a great number of living and well-formed women, and the following are the conclusions at which he has arrived, namely, that in eighty females it appeared:—

1. That the distance from the tuber ischii of one side to the posterior superior spinous process of the opposite ilium, was the same on both sides in twenty-one persons; in fifty-one, the difference between the two sides was from one to three lines; and in eight only it amounted to four, five, and six lines; whilst, in the oblique-oval pelves, the smallest difference was found to be one inch, and the greatest two inches.

2. That the distance from the anterior superior spinous process of one side to the posterior superior iliac spine of the other, was the same in both halves of the pelvis in twenty-two females; in fifty-one there was a difference of one to six lines between the two; and in seven women only was this difference from seven to eleven lines. In the oblique-oval pelves, the smallest difference between these sides was three-quarters of an inch, and the greatest two inches.

3. That the distance from the spinous process of the last lumbar vertebra to the anterior superior iliac spine, was the same on both sides, in twenty-nine instances; in fifty-one, there was a difference of one to seven lines between the two. But in the oblique-oval pelves, the least difference was eight lines, and the greatest an inch and a third.

4. That the distance from the trochanter major of one side to the posterior superior iliac spine of the opposite one, was the same in eighteen cases; when measured comparatively on the two sides of the pelvis, a difference of one to six lines in this distance was found in fifty-seven; and in five only it ranged from seven to nine lines; whilst, in the oblique-oval, the smallest difference was half an inch, the greatest an inch and a half.

5. That the distance from the lower border of the symphysis pubis to the posterior superior iliac spine, was the same on both sides in thirty-two women; in forty-six, the difference between the two halves of the pelvis, in this respect, was from one to six lines; and in two, from eight to nine lines; but, in the oblique-oval pelves, the least difference in this distance, taken on both sides, was seven lines, the greatest one inch.

It will, therefore, appear that, by a proper degree of care, and the aid of the measurements just given, we would be able to recognize the deformity in question, by measuring the aforesaid distances on each side, and then comparing the results obtained from both.

But there is yet another method for detecting the oblique-oval pelvis, says M. Nægèle; that is, if a woman, having a well-formed pelvis, be placed with her back against any vertical plane, as a wall, for instance, so that the shoulders and upper part of the buttocks be in contact with this plane, and then two plumb-lines be dropped, the one from the point corresponding to the spinous process of the first sacral or the last lumbar vertebra, and the other from the lower border of the symphysis pubis, it will be found that the latter nearly or quite covers the first; that is to say, that a line perpendicular to the wall would intersect both of these plumbs at a right angle; but this is not the case in the oblique-oval pelvis. In fact, one of its essential characters is, that the symphysis pubis is deviated towards one side, and the sacrum towards the other, whence the middle of the pubic symphysis is opposite to the anterior sacral foramina, or even to the sacro-iliac articulation on the non-anchylosed side. Consequently, when a woman, whose pelvis is thus deformed, assumes the position just indicated, and the plumb-lines are dropped at the designated points, the operator will find, by bringing his view perpendicular to the wall, that the line placed in front does not cover the posterior one; for the latter will deviate to the right or the left, according to the anchylosed side, and this deviation will be the more considerable, as the pelvis is the more deformed. (*M. Danyau's Translation.*)

ARTICLE V.

INDICATIONS PRESENTED BY THE DEFORMITIES OF THE PELVIS.

It is not our intention to treat, in this place, of the measures that it would, perhaps, be advisable to employ for the purpose of remedying deformities of the pelvis when they exist, for this subject belongs exclusively to the surgery of the osseous system; besides which, the various mechanical and gymnastic means hitherto used for correcting the deformities of the skeleton have had no efficacy in changing the form of the pelvis. But, if nothing can be done by the physician to cure, he is, at least, not wholly destitute of resources where there is still a possibility of preventing such deformities. Thus, during the earlier periods of life, especially, he ought to watch over all the circumstances that might influence the regular development of the skeleton, with the most tender solicitude; he should relieve rachitic children from constriction or pressure of every kind, which might, in their variable attitudes, modify the pelvic circumference; they ought to be left in the recumbent position as much as possible; the nurse must not always have the child in her arms, as she is very apt to have, if not cautioned; and great care is requisite not to permit them to walk too soon, not, indeed, until their bones have acquired a proper degree of solidity; and even then it should be by degrees, and only in proportion as their strength increases. We must not yield, says M. Bouvier, to the chimerical fears of augmenting the debility by depriving children of a necessary exercise; for repose, on the contrary, is much better suited to that state of languor which they generally exhibit; and, besides, we may obtain, by passive motion, by exposure to sunlight, and by general movements in the horizontal position, a sufficient compensation for the state of inaction in which they are kept during a part of the day.

The indications presented by the deformities in the pelvis, considered only with regard to the unfavorable influence they may have upon the puerperal functions, will evidently vary with the degree of deformity. When studying this influence, we classified all the malformed pelves in three categories, namely: all those having three and three-quarter inches, at the least, in their smallest diameter, were placed in the first; in the second, we have included those presenting two and a half inches, at least; and in the third, those whose smallest dimensions are under two and a half inches; and, following the example of Professor Dubois, we shall still preserve this division in the study of the indications offered by the deformities.[1]

§ 1. What is to be done when the Contraction is such, that the Pelvis measures at least three and three-quarter Inches in its smallest Diameter?

In such a case, the child may evidently present either by the vertex, the pelvic extremity, the face, or the trunk.

A. *Where the Child Presents by the Vertex.* — We have elsewhere stated that a spontaneous delivery is possible under such circumstances; and, consequently, that the wisest course is to wait and trust to the efforts of nature. But where the uterine contractions are exerted in vain for a long time after the membranes are ruptured, and the amniotic waters are partially discharged without the head making any progress, an application of the forceps is the only remedy to which we can resort.[2] But the exact moment for the employment of this measure is to be determined with greater precision. As a general rule, we may wait six, seven, or even eight hours after the membranes give way, and after the os uteri is fully dilated; and then, if energetic contractions have been uselessly exerted during all this time to overcome the obstacle, it will be necessary to interfere, and to apply the forceps; though it will be advisable to act a little more promptly where the head, after having been engaged for some time in the excavation, is arrested by a contraction of the inferior strait; and the same would be true if this strait were regularly formed, and the arrest of the head were dependent on a feebleness of the uterine contractions occasioned by the previous efforts on the part of the organ to force it through the contracted superior strait. It is unnecessary to add, that if any accident whatever, grave enough to endanger the health of the mother or the life of the child, should occur during the labor, it would demand a more prompt intervention

[1] I am happy to state that most of the following considerations and practical views are deduced from the excellent thesis which M. P. Dubois sustained with so much eclat in the concours, at the close of which he was nominated. I congratulate myself on being the first to give publicity to a work that is, unfortunately, but too little known.

[2] It is highly important not to confound in practice the constantly increasing tumefaction of the hairy scalp with an actual descent of the head. For, when the labor is retarded, the sero-sanguineous tumor, formed by the soft parts, continually augments in volume, and its summit gets nearer and nearer to the vulva; and, therefore, unless the precaution is taken to get an osseous portion of this region as a point of departure, the accoucheur might suppose that the head was traversing the excavation, and approaching the inferior strait, when, in reality, it did not move.

of art. Most generally, the frequently repeated auscultation of the pulsations of the heart would be satisfactory as to the child's condition, though even here only a certain degree of confidence can be reposed in this sign.

B. *Where the Child Presents by the Pelvic Extremity.*— When describing the mechanism of natural labor, we expressly recommended that no traction should be made on the pelvic extremity in breech presentations, with the view of avoiding the straightening out of the arms and an extension of the head; and we still insist on the same precept here. Nevertheless, in the case before us, if the largest part of the trunk is delivered, and the expulsion of the head is unusually delayed, it would be proper to hasten the termination of the labor by a moderate traction on the body; for such attempts, if well conceived and well directed in the line of the pelvic axis, would prove sufficient in most cases to accomplish the delivery. If, however, they are ineffectual, it will then be necessary to apply the forceps. (See *Version.*)

C. *Where the Child Presents by the Face.* — Although face presentations may terminate naturally in the majority of cases where the pelvis is well formed, it is not the less true, as elsewhere demonstrated (p. 345) that the labor is somewhat more painful to the mother, and is, besides, more dangerous for the child than in others. If, therefore, these difficulties, resulting from the position itself, are superadded to those which exist as a necessary consequence of the contraction, there can be no doubt that a delivery, left entirely to nature, would be attended with a very considerable risk to the fœtus. Under such circumstances, M. P. Dubois recommends the conversion of the face position into one of the vertex, by flexing the head, and then the application of the forceps, if the uterine efforts remain fruitless after the change. It appears to us that this cephalic version would be quite as difficult as the pelvic, if attempted long after the membranes are ruptured, and we should give preference to the latter, which, generally, would enable us to dispense with the use of the forceps. (See *Forceps.*)

D. *Where the Child Presents by the Trunk.*—If the contraction is discovered before the membranes are ruptured, or very shortly after, and the fœtus is very movable, we should endeavor to convert the presentation of the shoulder into one of the vertex, and then leave the expulsion to the efforts of the womb; but after the waters are discharged, the contraction of the organ renders the introduction of the hand and the cephalic version so difficult, that I consider turning by the feet much easier and less dangerous.

The pelvic version, in the case before us, is attended with some peculiarities that ought to be mentioned. For instance, where an undue development of the sacro-vertebral angle is the cause of the narrowing, it often happens, as before shown, that the base of the sacrum is turned a little to the one or the other side at the same time that it is projected forward, thereby constricting one half of the pelvis much more than the other; and hence, in performing the evolution of the fœtus, and drawing on its pelvic extremity, under such circumstances, it would evidently be requisite to turn its posterior plane towards the larger half of the pelvis, so that, when the head presented at the superior strait, its large occipital extremity would correspond to the non-retracted side.

It was stated above that when the fœtus presented by its flexed cephalic extremity, it would be necessary to apply the forceps, if the uterine efforts were incapable of terminating the labor; but the particular variety of malformation that we are now treating of may modify the rule laid down, which was perhaps a little too absolute; for, in this case, the position of the head must greatly influence the accoucheur's determination. Let us take, for example, a pelvis whose sacro-vertebral angle while projecting forward is turned to the right, so as to diminish the sacro-cotyloid interval very considerably on this side; now, the intervention of art being judged necessary, if the head is placed in the left occipito-iliac position, an application of the forceps will be the only practicable measure; whereas, on the contrary, if the occiput is directed to the mother's right, we should preferably resort to the pelvic version. This last operation, by converting a second vertex position into the first of the feet, would have the advantage of bringing the great occipital extremity of the head to the largest side of the pelvis, and would thus place the fœtus in a much more favorable position.

The delivery has frequently been rendered comparatively easy by the pelvic version when resorted to under such conditions; and M. Velpeau relates a case which he terminated successfully by this manœuvre, though other practitioners had deemed craniotomy to be indispensable in a former labor of the same woman.

The recommendations just made have the double object of sparing the mother from useless suffering, and more particularly of relieving the fœtus from the danger it would incur from a prolonged labor. Whence, it is evident, that the accoucheur's course will be somewhat different in those cases where there is a certainty that the child is not living; for, having nothing to fear on its account, he might accord a much longer time to the uterine contractions, especially as the head, which is then softened and reducible, contributes far more to an easy expulsion than under other circumstances. Consequently, he ought not to interfere in such cases, until he has ascertained positively, by a proper delay, the absolute inefficiency of the natural forces.

The child's death may also modify the precept above given in the trunk presentations, since the cephalic version was only recommended because it is more advantageous for the infant; therefore, after its death, the pelvic version would be preferred as being less painful to the mother.

§ 2. What is to be done when the Degree of Contraction is such that the Pelvis measures three and three-quarter Inches at the most, and two and a half Inches at the least, in its smallest Diameter?

If the fœtus dies before or during the labor, and the uterine contractions are ineffectually prolonged, we should, doubtless, prevent the dangers the mother might undergo from the delay, by resorting to embryotomy, and the application of the ordinary forceps, or even of the embryotomy forceps.

Again, if when the accoucheur is summoned to the patient, the membranes have been ruptured for some time, and the waters are partially or wholly evacuated; if the uterine contractions are exerted on the child's body alone,

or repeated attempts at extraction have been made without success; if, in a word, the child's life has been compromised, either by the length of the labor or the useless intervention of art,—in all such cases it may be regarded, though still living, as non-viable, and embryotomy is considered by most modern accoucheurs to be the only proposable measure. Being rather less fearful of the probable consequences of pelvic version in contractions of the pelvis, we now think, that so long as any chance remains in favor of the child, the latter operation should first be attempted. Craniotomy can always be had recourse to, if, after the disengagement of the trunk, it should be found impossible to extract the head. But where the degree of contraction alluded to is detected at the commencement of the labor, before the membranes are ruptured, at a time when there is no reason for supposing that the viability of the fœtus has been compromised, we shall admit a further subdivision, namely: one, where the pelvis has an extent of three and three-quarter inches at the most, and three inches at the least; and the other, where it has but three inches at the most, and two and a half inches at the least, in its smallest diameter.

Having waited for all that can reasonably be expected from the uterine contractions, the forceps are to be applied when the vertex presents favorably. Should the attempt prove fruitless, the contractions may be allowed to continue for an hour or two longer, when the instrument is again to be had recourse to. If moderate tractions are insufficient, the instrument should be withdrawn, and pelvic version attempted, in the hope of extracting a living child. If no favorable result follows this second application of the forceps, the life of the child being certainly compromised, we perform craniotomy. But should the child present by the face, trunk, or breech, turning is to be preferred.

When the pelvic diameters afford but from two and three-quarters to three and a quarter inches, the indications remain the same; but the difficulty experienced in executing the manœuvres leaves no alternative but a bloody operation.

Goodell thus sums up the mechanism of labor in narrow pelves:

1. The unaided first-coming head, and the aided after-coming head, observe in a flat pelvis precisely the same general laws of engagement and descent. Hence, version here means art *plus* nature.

2. The forceps, however applied in a flat pelvis, antagonizes more or less with the natural mechanism of labor. Hence, the forceps here means art *versus* nature.

3. The aided and the unaided first-coming head observe in a uniformly narrowed pelvis precisely the same laws of engagement and of descent. But version violates these laws. Hence, the forceps here means art *plus* nature; version, art *versus* nature.

4. At or above the brim of a flat pelvis, the fronto-mastoid, or even the fronto-occipital, application of the forceps interferes less with the moulding of the head, and violates less the natural mechanism of labor than the biparietal application.

5. In the flat pelvis, the vectis aids the natural mechanism of labor, and, therefore, meets the indications better than the forceps.

§ 3. What is to be done when the Dimensions of the Pelvis are under two and a half Inches?

If the child is living, we have, evidently, only to choose between the Cæsarean operation and the mutilation of the fœtus, for apart from some exceptional cases (see page 646), its spontaneous or artificial expulsion is here physically impossible. (See *Cæsarean Operation.*) But if it is dead, or if, in consequence of the duration of the labor, and the repeated attempts at extraction which have been made, there is reason to believe that its viability is so compromised that it might be considered as incapable of surviving after its birth, the indications will vary according to the degree of contraction.

Where, under these latter circumstances, the pelvis offers enough space in its smallest diameter to enable us to hope that, by reducing the size of the parts by craniotomy, the delivery can be accomplished without subjecting the mother to any very serious dangers, the mutilation of the fœtus should be resolved on, and its extraction effected by aid of the embryotomy forceps. But when the diameter is barely over an inch, we can no longer think of extracting the child by the natural passages; and the Cæsarean operation is then alone admissible. It is very important to know that with less than two inches, cephalotripsy becomes very difficult, because then the extraction of the base of the cranium, after the perforation of its vault, and the evacuation of its cavity, requires such numberless gropings and violent efforts, such repeated and grievous pressures and distentions, that the chances for the mother's safety after these painful attempts, which are sometimes made without any benefit, are not more favorable than those which follow the Cæsarean operation. Under these circumstances, M. Pajot proposes crushing simply, without traction. (See *Cephalotripsy.*)

In our remarks, thus far, we have supposed that the child always presented by its cephalic extremity; but, in order to fill up the outline we have traced, it is now necessary to point out what must be done when the pelvic extremity presents, the pelvis affording two and a half inches at the most. Under such circumstances, the head still adhering to the trunk after the escape of the latter, or entirely separated from it by decapitation, may become arrested above the superior strait. If, then, the least diameter of the pelvis amounts to two inches, craniotomy, and the application of the embryotomy forceps, will evidently be indicated. But if the contraction be still greater, it would be necessary, after having diminished the volume of the parts, and attempted in vain every effort at extraction compatible with the mother's safety,— it would be necessary, I repeat, to separate the head from the trunk, by dividing the neck, and to abandon its expulsion entirely to nature; for, notwithstanding all the dangers to which the woman would then be exposed, this would be better than the Cæsarean operation, performed after the almost total contraction of the womb.

If nothing has hitherto been said concerning a faulty direction of the axis of the pelvis, it was only because, like Professor Naegele, we do not attach to this particular variety of defective conformation all the importance that Lobstein and many other accoucheurs have attributed to it. The degree of inclination of the superior and inferior straits may depart widely from

the figure before given as expressing the average normal condition. Thus, the plane of the abdominal strait may be so inclined downwards as to be sometimes quite vertical, as in a woman described by M. Nægèle; while, at others, there is no inclination at all, being then almost horizontal; finally, the upper part of the symphysis pubis may be more elevated than the sacro-vertebral angle, the plane being inclined from above downwards, and from before backwards, as in the case reported by M. Bello. (*Transactions Médicales*, t. xiii. p. 285.) The plane of the inferior strait may present the same irregularities of inclination; indeed, the direction of both straits is most frequently changed at the same time.

But excepting some inconveniences which the woman suffers during gestation, that are more particularly dependent on the wrong direction of the uterus, whose displacement is often a consequence of the faulty direction of the axis of the superior strait, the puerperal functions are scarcely troubled by the anomaly mentioned; for although this abnormal direction of the pelvis has appeared in some few cases to present a serious obstacle to the delivery, it was only because it happened to coincide with a deformity of the bones and a contraction of the cavity. The facts reported by Moreau and Bello, when carefully examined, fully confirm the second part of this proposition, while the first is proved by the curious observations of M. Nægèle.

CHAPTER III.

OF BONY TUMORS OF THE PELVIS.

The tumors that may obstruct the excavation take their origin in the bones or in the soft parts, and are extremely numerous and varied; and, where they have acquired a considerable volume, they constitute one of the most serious difficulties in the practice of midwifery. It will not be in our power, in this work, to enter into all the details which the importance of the subject demands; besides, all that relates to the etiology, the pathological anatomy, and the symptomatology of these tumors, rather belongs to surgery than to the obstetrical art; and we must confine ourselves more particularly to pointing out to the practitioner those signs by means of which their diagnosis is established, as also to bringing into view the different indications they present for treatment. It is proper to state at the outset, that, in compiling this article, we have freely extracted from the learned dissertation of M. Puchelt on the subject, whose classification we retain.

The tumors, whose influence over parturition is about to claim our attention, may have their origin either in the walls of the canal which the fœtus has to traverse, and therefore appertain to the soft parts or to the osseous parietes, or they may be a dependency of the neighboring organs.

Tumors of the soft parts will be studied hereafter. At present we shall treat of those bony tumors which occasion, in many respects, a resemblance to contractions of the pelvis.

§ 1. Exostosis.

If we lay aside, says M. Danyau, all those cases in which an unusual prominence of the sacro-vertebral angle has been mistaken for a true ossific tumor, as well as those where there is an uncertainty with regard to their character, from the insufficiency of the details in the written account, there remain but two examples of exostosis, the authenticity of which is incontestable, namely, those reported by Leydig and Mackibbin. It would really be difficult not to admit the authenticity of the one reported by Gardien, since Duret preserved the pelvis of the female who was the subject of it for a long time in his cabinet.

The facts reported by M. Puchelt prove that most pelvic exostoses arise from the anterior face of the sacrum. Nevertheless, several other points of the pelvis have likewise been their seat; thus they have been known to spring from the sacro-vertebral articulation, from the last lumbar vertebra, or the first bone of the sacrum, and from the posterior face of the pubis, either from its middle part, or on one of the sides, as also from the internal face of one of the ischia.

What has been stated respecting the uncertainty of the published observations, forewarns us of the difficulty that is at times experienced in diagnosticating the pelvic exostoses, and in distinguishing them from the various prominences caused by deformities of the pelvis. The hardness of the tumor, and its original adhesion to the osseous parietes, are given as characteristic signs; its unevenness and immobility are also important to be ascertained. Being always covered by the vaginal wall, it projects into the interior of this canal, by pressing aside the organs situated before it. When arising from the anterior face of the sacrum, it impinges on the posterior wall particularly; and, if the rectum be then explored, the latter will be found slightly pressed forward by the tumor, which is itself located behind. This last sign is very important, for nearly all the other tumors are situated in front of the bowel.

The prognosis is necessarily dependent on the size and situation of the tumor, and on the earlier or later period of gestation, at which the labor takes place. It is evidently more serious when the abnormal growth is very voluminous; when it is so placed as to diminish one of the small diameters of the straits, and when the child's head is very large.

The indications for treatment, which were so fully described in studying the deformities of the pelvis, present themselves anew, and demand the employment of the same means, namely: to abandon the labor to nature when the tumor is small and so situated as to shorten the long diameters only; or to apply the forceps, resort to symphyseotomy, to the Cæsarean operation, or to embryotomy, according to the degree of contraction.[1] (See page 668 *et seq.*

[1] Pelvic exostosis has been the obstacle to delivery in eight American Cæsarean cases. One woman was operated upon three times, and died after the last operation. Five of the children were born alive. Four women recovered. Two had prior labors of three days each, and one of two days. (Harris ed. Playfair, page 581.)

[§ 2. Enchondroma.

Enchondromatous, or cartilaginous tumors of the pelvis, are quite rare. They were made the subject of an excellent paper published by our colleague and friend Dr. Dolbeau, (*Journal le Progres*, 1860.) which contains ten cases of enchondroma coincident with pregnancy, the one borrowed from d'Outrepont being given in the fullest detail. In this case, the tumor occupied the entire left half of the pelvis, was hard and globular, yet became so much softened during labor as to permit extraction of the child, which presented by the breech. In connection with Professor Depaul, I witnessed a case precisely similar to the one just mentioned; but as the patient recovered without ablation of the tumor, some doubts remain as to its real character.

These enchondromatous tumors seem to adhere to the bone or periosteum, either by a large surface or a slender pedicle; occasionally they are formed in the soft parts in the neighborhood only of the bony surfaces. They sometimes become quite large. (See *Le Traité Complémentaire des Accouchements* de Lenoir, Sée, et Tarnier. Paris, 1864.)

The indications to be fulfilled in such cases are the same as has been already laid down in respect to exostoses; (see above;) but the possible mobility of the cartilaginous tumors, and especially their softening, ought to modify favorably the prognosis in regard to the probable result of the labor. In extreme cases only is a bloody operation to be thought of.

§ 3. Osteosteatoma.

The term osteosteatomatous was applied by Lenoir to imperfectly defined tumors, composed of fibro-fatty and calcareous substances. He is, however, liable to the charge of having confused tumors of this character with enchondroma properly so called. Osteosteatomatous tumors always take their origin in the cellular tissue, and sometimes continue entirely free from any adherence with the bones of the pelvis, though most frequently they become attached to them. It is very difficult to establish a positive diagnosis between these tumors on the one hand and exostoses or enchondromatous tumors on the other. It is fortunate, therefore, that the conduct of the surgeon will be the same in either case.]

§ 4. Osteo-sarcoma.

Osteo-sarcoma of the pelvis is a very rare disease; two instances, however, are recorded, in which the contraction produced by it was extensive enough to require the Cæsarean operation.

The tumor can scarcely be distinguished from that of exostosis, unless, perhaps, by the inequalities it presents, and more particularly by the depressibility, the semi-cartilaginous softness, and the crepitation that it may offer at certain portions of its surface.

It is evident that this depressibility of the tumor will render the prognosis less serious than in cases of exostosis; since we may indulge a hope that the head being urged on by the uterine contractions, will flatten it down, and make it disappear in part. Consequently, it is here permissible to wait a longer time; but as soon as the inefficiency of the efforts of nature becomes apparent, we must resort at once to the same measures as in cases of pelvic contraction.

§ 5. Bony Tumors caused by Fractures.

Ossific protuberances in the pelvis may likewise depend on the irregular

consolidation of an old fracture in this part; or may be formed by the head of the femur, which, in consequence of coxalgia, has traversed the bottom of the carious and perforated acetabulum, and projects into the pelvic cavity. I recollect having read in a medical journal (which I cannot now find) an account of the Cæsarean operation having been performed in a case where the sole obstacle to delivery was thus formed by the head of the thigh-bone.

A representation of a fracture is given in the atlas of Professor Moreau, taken from the *Musée Dupuytren*, in which the bottom of the right cotyloid cavity has been driven in, the internal wall forming a rounded tumor that projects nearly an inch and a half inwards; the ilium was at the same time divided beyond the right sacro-iliac symphysis; but, in consolidating, the exterior part of the iliac fossa has been carried inwards in such a manner as to approach towards the sacrum, whereby the tumor formed by the cotyloid wall is brought near to the sacro-vertebral angle.

The *Journal des Progrès*, t. xv. 1828, contains another curious instance of a fracture of the pelvis, with a consecutive deformity in the excavation followed by mortal symptoms; this woman had previously had five fortunate deliveries. The Cæsarean operation has frequently been performed for obstacles of this nature; thus Burns, Lever, and Barlow have each reported a case of the kind. A very full account of this subject will be found in *L'Atlas et le Traité d'Accouchement*, de Lenoir. Paris, 1864.

§ 6. Anchylosis of the Coccyx.

Anchylosis of the coccyx is mentioned by Lusk as a condition which materially shortens the antero-posterior diameter of the outlet, and is a rare form of pelvic obstruction.[1]

CHAPTER IV.

EXCESSIVE RESISTANCE OF THE EXTERNAL GENITAL PARTS.

Even when the external genital parts appear to be perfectly well formed and the most thorough examination fails to detect a tumor or obstruction of any kind, cases sometimes occur in which they resist the passage of the child. These cases we propose studying in the present chapter.

§ 1. Smallness and Rigidity of the Vulva (*Vulvar Atresia*).

The rigidity of the external parts of generation, which is frequently observed in women who do not become pregnant until an advanced period of life, as also in very young, muscular girls, who are somewhat fat and of a plethoric habit, often causes a considerable delay in the progress of the head during the first labor. Most commonly, however, this narrowness and natural rigidity give way, and the parts become distended; but this distention is not always so complete as the volume of the head demands; and then the latter, being urged on by the violence of the uterine contractions, breaks down the resistance before it, and a laceration of the posterior vulvar commissure and of a more or less considerable portion of the perineum results. In certain cases, as elsewhere described, the contraction is vainly exerted for a long time against the resistance of the soft parts, and it becomes an

[1] *The Science and Art of Midwifery*, by Lusk, page 450.

feebled or ceases altogether; the intervention of artificial measures is then indicated, at first to restore the contraction if possible, and afterwards to replace it by moderate tractions with the forceps.

In cases of this nature, where the labor had been abandoned for too long a time to the resources of the organism, the fourchette, being too firm to yield, has been known to remain intact; while the perineum, distended beyond measure, and thereby rendered thinner, was perforated at its centre, and the child expelled through an accidental opening, bounded in front by the posterior commissure of the vulva, and behind by the sphincter ani muscle. At the present day, this fact is *well* determined. But it may happen that the perineum is perforated at its middle, and yet, notwithstanding this accident, the fœtus pass out through the natural passage: this is particularly apt to occur when the accoucheur's hand, being forcibly applied on these parts, endeavors to press back the head in its normal direction, and thus replace the accustomed resistance of the pelvic floor. Therefore, it does not follow that the child has escaped through the central laceration of the perineum, simply because such an opening is met with after the delivery.

Even when every precaution is taken, there are, as we see, cases in which extreme smallness of the vulva, and rigidity of the soft parts, make it impossible for the head to be expelled without greater or less rupture of the perineum. In order to prevent it, Michaelis advised, in 1810, incision of the posterior commissure. The example of Eichelbery might, however, be followed, and the incision be made on one or both sides of the vulvar orifice. This operation should be performed only when the head is at the vulva, and rupture of the perineum seems imminent. The blade of Pott's bistoury is to be glided on its side between the head of the child and the margin of the vulva, and an effort made to limit the incision to the extent just necessary to allow the head to pass. Eichelbery mentions a rapid and safe cicatrization of the wound, in recommendation of this incision of the thickest part of the vulva.

We therefore prefer lateral incisions: a single one may prove sufficient, but it is sometimes better to make them on both sides. The simplest way of doing it is by means of strong, blunt-pointed scissors, one of the blades of which is to be introduced flat between the head of the child and the vulva, to the distance of about three-eighths of an inch, and turned up when the incision is made.

The integuments are so distended when it becomes necessary to operate that very little pain is occasioned. The small wounds thus made are considerably shortened by the retraction of the vulva after delivery, and heal quickly.

The term episiotomy is applied to the operation. The increased danger from septic influences should deter us from having recourse to it. Incisions should be made from within out during a pain when the parts are most rigid, and care should be taken not to incise the external skin. Incision of the edge of the vulva is a very good operation, but slightly painful; yet it ought not to be had recourse to unless really necessary.

§ 2. Resistance of the Perineum.

It is not at all unusual, particularly in strong and muscular primiparæ, and in those possessing considerable embonpoint, to find the labor progressing very regular at first, the head clearing the cervix and descending into the excavation as far as the pelvic floor, and then its further progress to be entirely arrested; the uterus struggles energetically for a time against this obstacle, but, notwithstanding the force of its efforts, the head may remain there for several hours without advancing a single line. This resistance on the part of the perineum is evidently owing either to an excessive contraction of the muscular fibres that enter into its composition, or else to the presence of so great a quantity of adipose tissue, as to render this portion of the pelvic wall too inextensible to permit the escape of the head.

But whatever may be the cause of the resistance, it affects the ulterior course of the labor in two widely different ways, which it is highly important to distinguish in practice, for they require the employment of opposite means. For instance, it may happen that the uterine contraction, which was originally strong and energetic, is sustained in the same degree during several hours, but then, being overcome by the resistance which it cannot surmount, it grows weaker, is exhausted, and finally disappears altogether. The indications here are obvious; to endeavor to arouse the pains again, by making the patient walk about her chamber, by rubbing the abdomen or titillating the cervix uteri, and by administering the ergot: and, if all these prove ineffectual, to apply the forceps. But a very different case is occasionally met with, in which the contractions, so far from being exhausted, are kept up as strong and vigorous as at the commencement of the labor; and yet, notwithstanding their energy, they are incapable of effecting the dilatation of the soft parts in the perineum; this proving an insurmountable resistance against which the most powerful efforts are spent in vain. Here the accoucheur should evidently avoid the use of means calculated to arouse the contractions, — the ergot in particular would be exceedingly dangerous, — since the tetanic and irregular contractions that result from its use, and which have so often been followed by the death of the child, and even by a rupture of the womb that has almost uniformly proved fatal to the mother, are then particularly apt to occur. The uterus is certainly doing all that it can, and the physician should not attempt to arouse any more energetic contractions, but should rather aid its expulsive efforts by tractions carefully performed on the child; and an application of the forceps is clearly the only resource. Our view of its particular mode of action in the case before us will be studied hereafter in the article on *Forceps*.

Now, in order to illustrate this distinction, which we believe very important in practice, we will suppose two women in labor, in both of whom the child's head is properly situated, and has rested on the pelvic floor for six or seven hours; but in one of them, the contractions, that were at first strong and frequent, have gradually become more feeble and rare, or even have almost entirely disappeared; while in the other, on the contrary, they still maintain all their original power. In the latter case, we would apply the forceps immediately; whilst in the former, we should first have recourse to the various measures calculated to restore the pains, and we would only

resort to the forceps when these excitations had proved ineffectual, or the pains caused by the ergot still appeared to be insufficient.

It is also important to remember that the life of the fœtus may be greatly endangered by the ergotic contractions These, therefore, should not be allowed to continue too long. If the head is not expelled after the lapse of half or three-quarters of an hour from the commencement of the ergotic contractions, I should think it prudent to terminate the labor by the forceps.

This inefficiency of the pains brought on by the ergot is not very unusual in the case before us; but, even then, the administration of this article will have been useful, though an application of the forceps be afterwards deemed necessary; because the instrument will then be applied under much more favorable conditions; for the contractions produced by the secale cornutum will aid the artificial tractions; and, moreover, will prevent the consecutive inertia of the womb, to which the woman would have been exposed, if the instrument had been applied without previously exciting its contractility of tissue.

The entire field of the management of the perineum during labor has been fully considered by Goodell in an article published in the *American Journal of the Medical Sciences* for January, 1871. As shown by this author, there is very much diversity of opinion and practice in the profession upon this subject. The earnest seeker after truth will be left at last to his own judgment, or, what is perhaps better, will be inclined to let nature take care of the perineum.

From a consideration of the various means of *support as applied directly to the perineum*, Dr. Goodell remarks that it has not met with a great measure of success.

"The word '*support*,' as applied to the perineum, is a misnomer. No '*support*,' in the ordinary acceptation of the word, is afforded to the perineum by direct pressure. If such a method ever accomplishes any good, it is by retarding the advance of the head; in other words, by supporting the head through the interposed perineum, and not by supporting the perineum itself. Why not, then, support the head by pressure directly applied to it, instead of through a medium, which requires perfect freedom from all restraint, in order to undergo the requisite and inevitable amount of dilatation?

"Whenever, therefore, it seems proper to aid nature, insert one or two fingers of the left hand into the rectum, the woman lying on her left side, with her knees well drawn up and separated by a pillow, and work up and pull forward the sphincter ani towards the pubes. The thumb of the same hand is then to be placed upon the fœtal head, scrupulously avoiding all contact with the fourchette. The right hand need not remain idle; it assists the thumb in making the head hug the pubes, or in retarding its advance. After a pain, it presses back the head from the perineum, and this represses reflex uterine action. It restrains the movements of the woman; it pushes up the corrugated scalp, so that no folds shall remain beneath the sharp edge of the perineum to increase the circumference of the child's head; finally, it supports the emerging head and body, causing them to describe the curve of Carus.

"Before adopting this method of managing the perineum, but not since, I have often found occasion to apply the forceps, in order to extend and deliver the head, when the *ostium vaginæ* was rigid, or the perineum too unyielding for the pains."

CHAPTER V.

OF MALFORMATIONS OF THE VULVA AND VAGINA.

The malformations of the genital parts may be either congenital or accidental: but, as both offer very similar indications for treatment, I shall include them in the same description.

§ 1. Adhesion of the Greater and the Lesser Labia.

This may exist at birth, or it may result from some wound or ulceration, the healing up of which has not been properly attended to. Denman has remarked that this abnormal union is quite frequent in little girls, though it is rarely observed at the age of puberty, as the free and constant use made of their limbs, when they begin to walk, most probably causes a spontaneous separation. This union, when congenital, may be more or less complete, intimate, or resistant. When resulting from an accident, it is never perfect, because the frequent passage of the urine prevents adhesion from taking place at the point corresponding to the meatus urinarius; and the discharge of the menstrual fluid, when the courses come on before the cicatrization is completed, likewise prevents the adhesion of the labia for a considerable extent.

§ 2. Persistence of the Hymen.

The hymen may occasionally persist even after copulation, and thus constitute an obstacle to the expulsion of the child. The varieties of form it may exhibit under such circumstances were pointed out in the anatomical description of this membrane. A persistence of the hymen does not always prevent conception, since most authors relate instances in which they were obliged to divide it at the time of labor in order to make a free passage for the child. They have even detailed examples of pregnant women, in whom a second hymen was found some distance above the first. Again, this membrane has persisted after the delivery, as proved in a case observed by Meckel, Sen., and reported by Tolberg. A woman, after having expelled a fœtus of five months, surrounded by all its membranes, still preserved her hymen intact, circular, and tense.

§ 3. Obstruction from Cicatrices.

The smallness and rigidity of the external parts may be occasioned either by abnormal bands or unyielding and inextensible cicatrices resulting from wounds, or more commonly from the lacerations which are liable to occur in tedious or difficult labors.

Cases of this kind are not uncommon. De la Motte mentions one where a

is quite remarkable. August Berard relates in the *Dictionary* in 30 volumes a case in which after the operation of perineoraphy the vulva was so contracted as to render sexual intercourse impossible. In Vol. V. of the *Gazette Médicale* (April, 1837, p. 13) is reported a case of difficult labor due to an operation of episioraphy. All cases of this kind resemble each other, and the course of the accoucheur, under the circumstances, is very simple: a few incisions, and, if necessary, the use of the forceps, accomplish the delivery.[1]

It must not be supposed that all women, in whom the fourchette had been destroyed in a former labor, and in whom the band resulting from the cicatrix had constituted the obstacle to delivery, are as fortunate as she whose history I have just given; for sometimes a fresh laceration has occurred, and at others the resisting band has not yielded, and the child has been expelled through a central rupture of the perineum.

[1] To the numerous examples recorded in the books, I may add the following from my own experience: In the beginning of January, 1838, while I performed the duties of Chef de Clinique at the hospital of the Faculté, a woman of about thirty years of age was brought there, who was pregnant for the second time, and had reached her full term. She had been in labor since the previous Friday evening, and it was then Sunday morning. The patient informed us that the membranes were ruptured on Saturday at eight A. M., and that the head appeared to descend rapidly in the excavation, but was arrested in the passage. The accoucheur in attendance called one of his brethren in consultation, and they attempted an application of the forceps at two o'clock in the afternoon, without any benefit. At eight in the evening, everything being in the same condition, they renewed the use of the instrument, which still proved ineffectual. They then waited until Sunday morning, and had the patient transported to the hospital. As Professor P. Dubois was absent on her arrival, I examined the woman, and found that the head had entered the excavation and was resting on the floor of the pelvis, the inferior strait of which appeared to be slightly contracted. A transverse band, about the thickness of a large goose-quill, and composed of a very hard and apparently cartilaginous tissue, existed at the posterior commissure of the vulva. (The woman then told us that her former labor could not be terminated without resorting to the forceps, and that a considerable laceration of the perineum had resulted in consequence of its use.) At every contraction, which, however, was feeble and infrequent, the child's head pressed strongly against this bridle, but the latter did not yield in the least; and for two hours, during which we watched the progress of the labor before taking any part, the head did not advance a single line; besides, the vulva did not dilate, and the band remained as hard, resistant, and inelastic as ever. I was about to make an incision on the anterior commissure of the perineum; but a new examination of the parts having satisfied me that the lower strait was somewhat contracted, that the pains were very feeble, and consequently that the head's arrest might be dependent on these two circumstances, as well as upon the resistance of the band, I resolved to attempt a new application of the forceps. The head was then in an occipito-pubic position, or nearly so, though the occiput was still a little to the left; the blades were applied and locked without difficulty, but the first tractive efforts proved to be wholly abortive: after trying for a quarter of an hour, I succeeded in fairly engaging the head in the osseous strait: the posterior part of the perineum began to bulge out, though the commissure still resisted, and the pressure thus made on the soft parts seemed to arouse the uterine contractions, for the woman, from that moment, aided my efforts with all her powers. Under the conjoint influence of these two forces, the head constrained the vulva to dilate, the band gradually yielded, it became thinner and more distended, and finally, after three-quarters of an hour of constant tractions and almost continual pains, the head succeeded in clearing the vulva. The perineum was well sustained by an assistant, and did not exhibit the smallest trace of a laceration.

§ 4. Malformations of the Vagina.

The entire vagina, or only its upper part, may be wanting, as in the case mentioned (page 108), in which only the lower fourth of the canal was present. This kind of deformity is often coincident with absence of the uterus, in which case it is plain that the accoucheur has nothing to do.

It may be entirely or partially obliterated at some one point, either by partial or complete adhesion of its walls, or by partitions. The adhesion may be congenital, and the vagina reduced to a dense, solid, impervious cord, composed of mere cellular tissue; or it may be accidental, resulting most usually from lacerations or lesions during former labors, or else from wounds or injuries. Thus, in the case of a woman, reported by M. Lombart, of Geneva, who used a pint of sulphuric acid as an injection, with the culpable design of procuring an abortion, the bladder was found to be fused immediately into the rectum, the vagina having been destroyed at the corresponding part; and M. Cruveilhier has known the vulvo-uterine canal to terminate in a cul-de-sac, about an inch from the meatus urinarius, in consequence of vaginal injections made with a solution of corrosive sublimate.

The partitions spoken of as existing in the vagina may be transverse or longitudinal; and most of the cases of double or triple hymen mentioned by authors can probably be referred to the former. These may be complete, that is, they may divide this canal into two distinct cavities, though more frequently they exhibit a small opening through which the liquids ooze;[1] or incomplete, only obliterating it in part; consequently their form is very variable in different cases.

[1] A very singular case of dystocia, caused by a sort of bridle in the vagina, was reported to me by my friend Dr. Pignant, of Creuzot. When the child was about to be expelled, the head passed above a sort of bridle or bridge, whilst the body was disengaged below it, so that the neck of the child remained applied against the vulva, retained there by the bridle. The midwife in attendance would not venture

[1] In the course of the year 1857, a young woman, who was advanced to the last month of gestation, presented herself at the clinic of the Faculté. When the vaginal touch was resorted to, the finger was arrested, at the depth of one inch and a half or two inches, by a perfectly smooth septum, in which it could detect no sensible opening. By a resort to the speculum, it became evident that the obstacle to the entrance of the finger consisted of a membrane, which adhered to the walls of the vagina, and completely blocked up its cavity at this point. Its surface appeared to be nearly an inch in diameter; and, by pushing and distending it with the extremity of the instrument, a small opening was detected towards the upper third and right portion of this partition, through which a few drops of sero-purulent liquid were oozing.

The extremity of a blunt probe could scarcely be made to penetrate the little orifice, which was directed obliquely from below upwards, and from before backwards; the instrument then entered a kind of posterior chamber, formed by the upper wall of the vagina. Thus far, no accident had impeded the course of the gestation, but some difficulty was thenceforth anticipated at the time of labor. This patient was taken during the night with pains, but they were so feeble that a commencement of the labor was not suspected; though about five o'clock in the morning very strong and frequent ones came on, which effected the expulsion of the fœtus. The lying-in was very favorable, and two weeks afterwards I found that the septum had been split into three distinct pieces—one inferior and two superior. I have examined this woman several times since, and am satisfied that the flaps still remain isolated.

to cut the constricting part, which was rounded in form, muscular in appearance, and as thick as the little finger. The child perished in consequence. Upon examination, the bridle was found to have a longitudinal direction, with its two ends inserted upon the vagina.]

Where the septa are longitudinal, at times they only divide the vagina in a part of its extent; but at others, they separate it throughout. In the latter case, the continuity of the partition may be interrupted at some part, and then the two canals which it forms will communicate through this opening. The septum, when complete, is occasionally prolonged into the uterus, which it likewise divides into two cavities, although this does not always happen.

The vagina may have been originally very small, or it may have undergone a remarkable diminution or contraction. This, in some cases, has been carried so far as scarcely to permit the introduction of the female catheter. M. Moreau observed a young woman in the fourth or fifth month of her pregnancy, in whom this canal was so contracted that it barely admitted the barrel of an ordinary writing-quill. Such a disposition, which gives rise to much uneasiness, nearly always yields to the natural progress of the gestation.[1]

Again, the vulvo-uterine canal may be deviated from its usual course, and present no natural openings at the parts of generation. The points at which it then terminates are very various; thus it has been known to open below the navel by two small orifices, separated from each other by a strong membrane, one of which gave passage to the urine, and the other to the menstrual fluids; frequently, it discharges into the rectum. Portal states that a young girl, in whose vulva there was only a small opening for the passage of the urine, and whose menses were always discharged by the anus, became pregnant; yet the small opening enlarged sufficiently during the latter stages of gestation, and more particularly during the travail, to permit a spontaneous termination of the labor. M. Rossi reports that, having been called to a woman in labor, he discovered a total absence of the external genital organs. At first, he supposed there was a retention of the menses, and, under this impression, made an incision about two inches long in the direction of the vagina; when, instead of the menstrual blood, he encountered a male child, which escaped through this opening, and lived but seven hours after its birth. Whilst searching where the fecundation could have taken place, he discovered, after having interrogated the husband, a small orifice, near the sphincter ani and at the internal part, which would scarcely admit a fine probe.

[1] Plenck states that, being summoned to a woman in labor, he found the vagina so contracted that the little finger could not be introduced at all. Nevertheless, this canal was sufficiently dilated by the end of eighteen hours, and the child's expulsion took place without producing any laceration of it or of the external genital parts. (*Elementa artis Obstetriciæ*, p. 113.)

Merriman states that the labor terminated spontaneously in thirty-six hours, in a case where the introduction of the finger was barely possible; but the patient died on the third day, and a small laceration of the vagina was found at the *post-mortem* examination. (*Synopsis*, p. 59.)

The various obstacles just studied are most frequently surmounted by the efforts of nature alone; and, therefore, as a general rule, there is no necessity for an early resort to cutting instruments. If, however, it be deemed advisable to have recourse to an operation before the labor, for separating the agglutinated parts, incising the hymen, or for destroying an abnormal septum or vaginal adhesion, it would be better to wait until the first four or five months of the gestation have passed over; because, after this period, there would be less reason to fear the unfavorable influence which the shock caused by the operation might have over its progress. As the hymen and the vaginal septum are nearly always perforated by an opening, a director might be introduced into it, along which a bistoury should be passed, so as to incise the parts; where it is necessary to divide the adherent labia, we might use the scissors, as their agglutination is always incomplete; but, in all cases, the incision must be carried as low down as possible, so as to open a free passage for the lochia. When it is desirable to destroy the hymen or a septum, it is usually recommended to make a crucial incision, and even to excise the flaps to prevent them from afterwards reuniting. A similar plan would be resorted to, at the time of parturition, excepting that the same importance does not attach to the excision of the flaps, as the discharges of the lochia would prevent their reunion.

As to the bands and partial contractions found at some part or other of the canal, we should delay our operation, for they most generally become softened and ultimately permit the delivery to take place; in the contrary case, they must evidently be incised.

Finally, an accidental and complete obliteration of the vulva, occurring during the course of gestation, would require the creation of a new passage for the head, as soon as the latter distends the perineum; and it is advisable to make the incision in the place usually occupied by the vulvar orifice.

§ 5. Inversion of the Vagina.

Inversion of the vagina occasionally takes place during parturition; that is, the mucous membrane of this canal being pressed down by the child's head, and consequently being more or less inverted, forms a livid and fungous cushion of considerable size between the labia, or beyond the vulva, which opposes the passage of the head. The pressure made by this part on the inverted membrane, often gives rise to gangrene; and, therefore, with a view of preventing this unfortunate result, the forceps ought to be applied at once. The causes that predispose the patient to an inversion of the vagina are: a long and difficult labor, a large head, and a marked relaxation of the mucous membrane. If this affection is detected before the head is engaged, the accident might be prevented by pushing up the membrane at the commencement of the labor, and maintaining it there until its close.

CHAPTER VI.

TUMORS OF THE VULVA AND VAGINA.

The vulva and vagina are liable to be affected with a variety of tumors, of which we shall have to notice, œdema of the labia externa, thrombus of the vulva and vagina, cysts, abscesses, fibrous tumors pediculated or otherwise, cancerous degenerations, and all the vegetations

§ 1. Œdema of the Labia Externa.

The œdema of the greater labia, already alluded to, when treating of the complications of pregnancy, is sometimes so considerable at the time of labor as to obliterate the entrance of the vagina almost completely; and, by opposing the necessary distention of the vulva, it may render the parturition very difficult, as well as exceedingly painful. The child's head may produce a gangrene in the parts thus tumefied, by the pressure on them during its passage, or, at least, it may cause an extensive rupture. These accidents are to be prevented by making punctures with the lancet in all the swollen tissues; the number of the punctures will necessarily vary with the extent of the swollen parts, and the degree of their engorgement.

[Œdema of the entire soft parts of the cavity of the pelvis, especially in women who have naturally much embonpoint, occasions a sort of constriction of the genital passages which obstructs natural delivery, and embarrasses much the operator when he finds it necessary to interfere. Although this is quite a rare cause of dystocia, it nevertheless happens; indeed, quite recently, at the Hospital St. Antoine, it rendered delivery very difficult in the case of a woman attacked with convulsions, although she was very well formed.

§ 2. Sanguineous Tumors, or Thrombus.

Thrombus of the vulva and vagina consists in an effusion of blood in the soft parts of the lesser pelvis or of the vulva. It sometimes extends above the superior strait, and even quite high into the abdomen. Thrombus, therefore, is a true hemorrhage, and on this account there might be some advantage in describing it in connection with the other losses of blood which are liable to complicate labor, were it not that the causes which produce it, the tumor which it commonly forms in the vagina, and the treatment which it requires, distinguish it so clearly from uterine hemorrhage that it has seemed more proper to classify it with the tumors of the vulva and vagina. The very name of the affection also justifies the position which we assign to it.]

The tissue that constitutes the lips of the vulva, and lines the entrance of the vagina, is composed of venules, arterioles, cellular filaments, and fatty masses, so interlaced and held together, that an effusion of blood there is almost always abundant; besides which, the stagnation of the fluids in the external genital parts, and the varicose state of the vaginal veins, so frequent in pregnant women, predispose all these organs to what is denominated thrombus. In fact, during gestation, and more particularly in the course of its latter months, these large veins are apt to give way, either spontaneously, or in consequence of some external violence, and the blood is extravasated into the cellular tissue, whereby a considerable tumor is developed; and, in

the course of a variable period, gangrene attacks the distended parts, and hemorrhage, which is occasionally very profuse and sometimes even fatal, takes place.[1]

Thrombus of the vulva does not appertain to pregnant women exclusively, since it may also appear in the non-gravid condition; indeed, according to Velpeau, it is even more frequent then than during gestation. However, it must be acknowledged that the obstruction to the circulation in the lower extremities caused by the development of the womb, must necessarily favor the production of this tumor; and, consequently, that, in the non-pregnant state, a thrombus of the vulva is far less dangerous than in the opposite condition.

This tumefaction most generally affects the great labia, though it has also been observed in the lesser; in most cases a single lip only is involved, though at times there is a double tumor, caused by a simultaneous effusion into both of the labia externa. Wherefore, Boër was wrong in supposing that the right one was its exclusive seat, for it may appear indifferently on either side.

It is rarely present in the earlier months of gestation, but is more frequent in the latter periods, and particularly so during the labor, or after the delivery. The most common cause of thrombus during pregnancy, are blows, falls, violent concussions, etc., etc. In some cases it can be traced to no external violence, and then the spontaneous rupture must evidently be referred to an excessive distention of one of the vaginal veins. When occurring during labor, this affection is nearly always manifested just as the head or breech endeavors to clear the vulva, after having reached the inferior strait. The rupture of the veins is then certainly caused by the distention, which they, like all other parts, are subjected to, (a distention to which they yield with more difficulty,) and by the great accumulation of blood produced by the obstruction to the circulation from the presence of the child's head. Therefore, an excessive size of the latter, or its unusual delay at the inferior strait, a narrowing of the pelvis, and the consequent immoderate efforts on the part of the patient to overcome the resistance, are its most common causes. Certain authors have likewise supposed that the obliquities of the womb, and the frequent rough examinations of the parts of generation, might produce them; but it is evident that such circumstances cannot have the attributed effect, unless a varicose predisposition exists at the same time. Ordinarily, these tumors only appear after the delivery, when, indeed, they are the more dangerous; first, because they may the more readily escape unperceived, and then, because the relaxation of the parts permits them to acquire a very considerable volume.

The remark of M. Deneux should be borne in mind, that most of the cases of thrombus which are not detected until after delivery, really commence during the labor, or, at least, that the rupture of the vessels, if not the effusion, takes place during the first expulsive pains. Often, indeed, when a

[1] This accident was described quite accurately, in 1647, by Veslingius. "I have twice," says he, "witnessed an effusion of blood between the vaginal tunics, in cases of difficult labor. The labia presented a considerable tumor, which, when opened, discharged quite a large amount of blood."

vein is ruptured, it is so compressed by the head in the excavation as to prevent any effusion, a free escape of blood taking place only after the labor is terminated. It being rarely necessary to introduce the hand into the vagina after the delivery of the placenta, the tumor will not be discovered until it has become so large as to incommode the patient, or the physician is alarmed by the general symptoms of hemorrhage. Therefore, considerable time may elapse between the commencement of the accident and its detection.

Still another condition may postpone the appearance of the thrombus, namely, the stoppage of the small opening in the vein by a coagulum.

Finally, it may happen, as supposed by M. Dubois, that the badly contused, and perhaps even mortified walls of the vessels, do not give way until when, at a later period, the part which has suffered the pressure becomes detached. The mucous membrane, being more extensible than the walls of the veins, recedes, so to speak, before the violence which affects the distended vessel, and is not, therefore, so much injured by it. Thus is explained the late effusion of the blood into the submucous cellular tissue, and the consequent formation of a tumor.

[M. Perret (*Paris Thesis*, 1864) maintains, moreover, that the head of the child may occasion a sort of sliding of the walls of the vagina upon the surrounding tissues, and terminate in the detachment of the walls for a greater or less extent, with rupture of the cellular partitions. Thus is formed a cavity of variable size, which may become filled with blood from the ruptured capillary vessels. In support of his opinion, M. Perret refers to an autopsy, in which he saw the water of an injection, thrown into the femoral vein, make its appearance over the entire surface of the cavity; from which he concluded that no important vein had been injured.]

It is highly probable that the thrombus which forms during labor is occasioned by the rupture of one or more veins, and the same is true for that which makes its appearance after delivery; only, in this case, the effusion does not occur until after the child is born. We can imagine, however, that the phenomena may take place differently; for, as the walls of the veins are often very much weakened, either by extreme distention or the stretching to which they are subjected during the labor, it is possible that a sudden movement, a violent inspiratory effort, or a fit of coughing, might suddenly cause such an afflux of fluid into them, as to produce their spontaneous rupture even after the lapse of several hours from delivery.

The development of a sanguineous tumor is generally announced by a severe pain in the affected part, caused, doubtless, by the rupture of some of its vessels; then one, or sometimes both of the greater labia, or, perhaps, only the nymphæ, soon swells up, becomes rapidly distended, and forms a more or less voluminous tumor. This tumor may acquire a considerable size, and the quantity of effused blood be great enough to debilitate the patient, and, possibly, to produce syncope. In some instances, it acquires its full volume at once, while in others it goes on augmenting for twenty-four hours; it may be limited to the external parts, or it may extend deeply into the pelvis, and, possibly, as far as the iliac fossæ.

In a paper published in 1860 on the seat of thrombus, M. Laborie based

his classification upon an account of the aponeuroses of the perineum, and makes the following varieties:

1. Superficial thrombus, which may spread to a great distance beneath the skin, extending back near to the anus, upward in front to the abdominal parietes, and laterally to the gluteal region.

2. Thrombus situated between the superficial and middle aponeuroses, and limited to the confines in which it occurred.

3. Thrombus situated between the middle and superior aponeuroses; it is always very small.

4. Thrombus between the superior perineal and the pelvic aponeuroses. In this variety, the blood may make its way to a great distance, reaching, laterally, into the iliac fossæ, and backward to the sacrum, and even to the lumbar region.

5. Thrombus above the pelvic aponeurosis. Here the effusion takes place into the sub-peritoneal cellular tissue, and may invade the entire pelvis, the broad ligaments, and ascend in the substance of the mesentery as far as to the diaphragm.

6. Finally, he describes, as a sixth variety, an effusion of blood in the tissue of the vaginal wall itself, without rupture of the fibrous tunic. In this case, the effusion dissects the vagina, and presses it inward.

All these divisions are rather anatomical than clinical, but we reproduce them, in order to show clearly how very variable the seat of thrombus may be.

In 1846, I had occasion to witness a case in which the effusion had spread very widely. The autopsy revealed a layer of coagulated blood between the muscles and peritoneum, spread over the whole lower half of the anterior walls of the abdomen on the right side. The layer was nearly a quarter of an inch thick, and extended from below upward to about two fingers' breadth below the umbilicus, besides occupying transversely the entire space between the linea alba and the crest of the ilium.

At the latter point, the layer of blood was continuous with a clot about three-eighths of an inch thick, also situated beneath the peritoneum, and lining the entire iliac fossa. Below and inward, it turned over the edge of the superior strait, and was lost in a large collection of coagulated blood, which formed the tumor that during life had especially attracted our attention. The clot in this place was at least five-eighths of an inch thick at the centre, but it grew thinner as it spread out over the entire right side of the excavation: the remaining cellular tissue of the pelvis was highly colored by infiltrated blood.

The disaster was not, however, limited to what we have described, for in ascending, and separating the peritoneum upon the posterior and right lateral side of the abdomen, the coagulated blood was found to extend as far as the right hypochondrium, and to imbue the entire cellular tissue surrounding the kidney; it also passed between the folds of the peritoneum forming the origin of the mesentery, and finally extended to the attachments of the diaphragm to the false ribs of the right side, which connections seemed to have been the only barrier to its further progress. The thickness of this large coagulated layer varied from one to two-eighths of an inch. The

total amount of effused blood was estimated at two pounds by those who witnessed the autopsy.[1]

Again: it not unfrequently happens that the effusion commences within the pelvis, and subsequently approaches the exterior. The tumor shortly assumes a violet or livid hue; and when the thrombus is seated high up, this discoloration of the skin rarely permits it to be mistaken; when lower, and in the substance of the greater labia, on the contrary, it may neither be accompanied by ecchymosis, pulsation, nor throbbing. Where the blood infiltrates into the meshes of the cellular tissue only, the tumor is hard; but it becomes soft and fluctuating when this texture is torn, and there is an abnormal cavity formed. Again, it is not unusual for the skin, or mucous membrane covering it, to give way in consequence of being gradually rendered thinner; thereby giving vent to a considerable discharge of blood, with an instantaneous cessation of the pain; and this hemorrhage may be so profuse as to speedily terminate in death, especially if the tumor be voluminous, and the rupture occurs during the efforts of parturition. Cases have been known in which the rupture was followed by a projection of a jet of blood with such force and abundance, as to fall at a distance of several feet from the patient, and to be mistaken by the attendants for a rupture of the membranes, and discharge of a large amount of water. Whenever the nature of the accident was mistaken and the proper measures were not employed, the patient succumbed in a few minutes.

A copious bleeding has occasionally taken place during the formation of a thrombus. In fact, this circumstance may occur whenever the mucous membrane and one or more of the veins are lacerated at the same time. Should the two openings not correspond with each other, one part of the blood will escape into the vagina, and the other be infiltrated into the cellular tissue.

Where the thrombus has acquired a considerable size, it may evidently impede the passage of the head, and after the delivery, that of the placenta and lochia.

Madame Lachapelle relates a very curious instance, in which a thrombus, that had first commenced during the labor, underwent a rapid development after the child's expulsion. The tumor obstructed the vagina so much, that it prevented the escape of the lochia, whence the latter accumulated in the womb, and became, somewhat later, the source of a profuse hemorrhage. Fortunately, she continues, in the attempts to introduce my hand into the uterus, for the purpose of extracting the clotted blood, I ruptured the tumor involuntarily, near the entrance of the vagina, when a large quantity of coagulated blood immediately escaped, its size diminished, and all the attendant symptoms disappeared without any particular treatment.

Finally, the pressure of the tumor on the neck of the bladder may cause retention of the urine and fecal matters.

When the thrombus appears early in pregnancy and has been emptied by incision and the patient cured, it may reappear some time after and at the same place. A relapse of the kind is reported by Montgomery. The tumor, which 'showed itself' in the left labium in the seventh month of gesta-

[1] For the details of this case, see the *Gazette Medico Chirurgicale* (February 28, 1846).

dion, caused so much pain as to induce the author to puncture and empty it on the 18th of June. He was sent for again on the 13th of July, and discovered a much larger tumor than the preceding, and was again obliged to puncture it in order to relieve the patient. It did not return until the 24th of August, at which time the young woman was delivered.

The diagnosis of these tumors is, in general, quite easy; for their sudden appearance, their rapid development, their hardness when the blood is simply infiltrated, and fluctuation when it is collected in an abscess; the violent pains they give rise to, and the bluish discoloration of the skin, are always sufficient to detect them. Nevertheless, they have sometimes been confounded with certain other tumefactions, such as the simple varicose ones, an inversion of the vagina, the descent or inversion of the womb, and with the vaginal hernia formed either by the intestine, the omentum, or the bladder; but as we shall have occasion hereafter to treat of each of these tumors, and their peculiar signs, it seems useless to enter here into their differential diagnosis.

The prognosis is usually unfavorable; thus, "in sixty-two cases brought to my knowledge," says M. Deneux, "the mother died in twenty-two of them, either during the gestation, or else during or after delivery; and with the exception of a single instance, all the children of these twenty-two females were likewise lost." The profuse hemorrhage is the most frequent cause of the patient's death, though the latter may also be occasioned by the gangrene and suppuration which often follow the primary symptoms.

[The gravity of the prognosis, as asserted by Deneux, is confirmed by M. Blot in his thesis for the *Concours* (Paris, 1853). In making out a statement of 19 cases published since 1830, the latter author finds that five of them were fatal. All the children of the mothers who died were still-born.]

These tumors may terminate either by resolution, suppuration, rupture, or gangrene; but as the progress of the disease exhibits nothing peculiar in any of those cases, we shall merely mention them in passing.

The *treatment* of thrombus necessarily varies according to its size, and the sufferings thereby occasioned to the female, as also to the period at which it is manifested. If the patient be in labor when the tumor is developed, and the latter be large enough to seriously impede the passage of the head, the effused liquid should evidently be evacuated by a free incision, made on the most dependent part of the swelling, the extent of which must be proportioned to its volume. If this operation is performed some time before the head engages in the excavation, it would be advisable, after having emptied the sac, to make use of the tampon in order to prevent hemorrhage; but if, on the contrary, the tumor is only opened when the head is fully engaged, the application of the tampon may be dispensed with for the child's head will sufficiently compress the divided vessels to prevent a further discharge of blood. In the latter case, it would be requisite to attend to the precautions described below, after the delivery.

The question is not, however, so easily decided when the thrombus appears during pregnancy or after delivery, and authors are far from being unanimous as respects the course to be pursued. To give greater precision to our therapeutic recommendations, we shall distinguish the cases in which

it is necessary, 1, to incise immediately; 2, to incise at a late period; and, 3, to omit incision altogether.

1. *When it is necessary to Incise immediately.*—The tumor is sometimes so large as to fill a great part of the excavation, and seems capable of obstructing the discharge of the lochia. Careful examination then shows the skin or the mucous membrane covering its internal surface, to be so greatly thinned by distention and to present so deep a violet hue that gangrene or spontaneous rupture seems likely to occur at any moment. On the other hand, the quantity of fluid effused, and the disorder which it necessarily produces in the cellular tissue in which it has formed a large cavity, renders its absorption very improbable; the evident fluctuation discoverable over the greater part of the tumor induces the reasonable belief that it does not contain a large clot, and that there is nothing, therefore, to prevent a continuance of the internal discharge. The patient experiences acute pain, and, lastly, her increasing weakness, the feebleness of pulse, pallor of the skin, &c., lead to the opinion that the disorder is not limited to the tumor of the excavation, but that in all probability the blood is making its way to the upper part of the abdomen. Under these circumstances, it would certainly be nothing short of folly to depend upon the efforts of nature alone, and immediate incision appears to us indispensable.

2. *Postponement of Incision.*—If, however, the tumor is small, being no larger, for example, than an egg; if the walls are of considerable thickness and of a natural color; if it is but slightly painful, and does not appear to increase in size; if, from the coagulation of the effused fluid, fluctuation becomes more and more obscure; if, in a word, there is every reason to hope that the internal hemorrhage is not only arrested, but its recurrence rendered impossible through the compression of the ruptured vessels by the coagulum, I have no hesitation in believing that everything should be done to assist resolution, and, consequently, that the instrument should not be used, unless rendered necessary by certain accidents, which may occur under the circumstances.

This method, I am aware, has both its advantages and disadvantages; still I regard the former as of greater importance than the latter. As advantages, I would mention: 1, the possibility of absorption, which we certainly have occasion frequently to observe as taking place with much larger effusion; 2, the rarity of consecutive hemorrhages. This latter point we shall discuss hereafter.

The partisans of immediate incision reproach expectation with exposing the tumor to suppuration and gangrene, besides thinking that a late incision does not always protect against hemorrhage. Let us examine the worth of these objections.

The attempt to bring about resolution does not dispense with the necessity of a careful oversight of the case: now, before becoming affected with gangrene, the walls of the tumor present to the attentive eye of the surgeon certain changes which forewarn him of the danger. On the other hand, when the blood, which, extravasated in the tissues, acts as a foreign body, and excites around it first an irritation and then an intense inflammation, suppuration does not take place without having been preceded by heat,

redness, greater or less tension of the tumor, and more or less pain to the patient: now we can hardly expect the physician to be so negligent as to allow all the phenomena of a suppurative inflammation to pass undiscovered. Therefore, as soon as the tumor, so far from progressing toward complete resolution, presents some of these preliminary symptoms, it will be time enough to have recourse to the operation. But would it not have been better to have practised it at once? Certainly not; for independently of the chances of obtaining resolution, you have now the advantage of performing incision under circumstances the best calculated to prevent consecutive hemorrhage.

Indeed, it seems to me undeniable, that, when the hemorrhage has ceased for several days, and the greater part of the blood is converted into a solid clot, which, either by direct compression, or by extending into the opening of the ruptured vessel, shall have obliterated the latter, the cavity may be incised without probability of hemorrhage. I am acquainted with the observations relied on by M. Deneux and others, as showing that secondary hemorrhage is not an impossible occurrence; but, in my opinion, they are far from being conclusive against the opinion which I hold.

If hemorrhage is ever to be feared as a consequence of opening sanguineous tumors of the vulva and vagina, I certainly maintain that it is especially so when practised immediately; for, as the rupture of the varicose veins is then recent, there is nothing to prevent the blood from flowing externally: the determination of blood to the parts, which may have contributed to the production of the rupture, still exists, and during pregnancy, the obstruction to the return of the circulating fluid by the large veneus trunks, in consequence of the pressure of the uterus, highly developed as it is, and situated above the superior strait, is remarkably well calculated to produce venous hemorrhage. I am well aware that the tampon may be applied, as also that the partisans of immediate incision rely chiefly upon it; but whoever has used the tampon, knows what suffering it occasions when it has to be left in its place for several days, and how difficult it is, notwithstanding all the means proposed for the purpose, to maintain a free discharge of the lochia.

It appears to me that M. Velpeau, who treats the fears of some authors on the subject of hemorrhage as chimerical, has had reference rather to cases of thrombus frequently witnessed by him in non-pregnant women, than to those which appear in the puerperal state; *for, according to him, there is no vessel in this region large enough to become a source of anxiety.* This last proposition I esteem erroneous, if it be intended to apply to pregnant females; it is well known that the arteries and veins of the vagina share in the development of the entire generative apparatus, and all practitioners have felt the varicose veins projecting beneath the vaginal mucous membrane during pregnancy, and also the pulsations of large arteries. The latter sensation is so evident as to have been styled, by Osiander, the *vaginal pulse*.

Finally, it may be said that, by deferring the incision of the tumor, we incur the risk of an extension of the effusion, and a separation of the peritoneum over a large surface, all of which would have been avoided by pro

viding a free exit externally. This, doubtless, is possible; but when we come to reflect upon the conditions by which we would limit the expectant method, and the attempts to obtain resolution, it will be seen that we are protected from any such danger. Besides, if it is necessary to apply the tampon after immediate incision, may not this have the same effect by obstructing the discharge of blood outwardly? Unfortunately, this is no hypothesis, for it is supported by one of M. Deneux's own observations.

At whatever period the incision is practised, it is best not to insist upon the removal of all the clots; but, at the first dressing, to respect all that seem to adhere to the surrounding parts; for while their immediate detachment would risk a return of the hemorrhage, they would come away gradually at the subsequent dressings. If necessary, their separation might be assisted by daily injections.

Another question has reference to the part of the tumor to be operated upon. Most authors agree to make the incision external, that is, through the integuments; for they find that the dressing is thereby rendered easier, that it does not require the introduction into the vagina of foreign bodies, which might obstruct the discharge of the lochia, and that the wound is not subject to irritation from the uterine fluids. I would add that the cicatrix would be less dragged upon in future labors, and, therefore, less exposed to rupture when the external parts are greatly distended by the fœtal head I therefore adopt the external incision but upon one condition, namely, that it shall be possible, which is not always the case; for when the tumor is situated in the greater or lesser labia, it presents two surfaces, one mucous and the other cutaneous, and unless there exists a very thin and altered point,[1] which of itself deprives the surgeon of the power of choosing, it may be incised either outwards or inwards. But the thrombus is not always situated so low down; in such cases, and I would recall the one the details of which I have already related, the tumor being altogether within the excavation, and limited outwardly by the bony walls of the pelvis, presents none other than a mucous surface to the instrument. Therefore, should incision be deemed necessary, it can then only be practised upon the wall of the vagina.

I make this remark, because it forms, in my opinion, an additional reason for recommending late incisions. A large wound in the walls of the vagina is not, under ordinary circumstances, a serious affair; but in the case of a newly delivered female it would be attended with great inconvenience; for, not to speak of the serious consequences which might result from the introduction of the uterine fluids into the cavity, it is evident that a dressing which should be at once sufficiently protective and suitable, and at the same time permit the free discharge of the lochia, would be of very difficult performance.

When incision is decided upon, it should be practised freely; for a simple puncture would allow only the fluid blood to discharge, whilst clots of considerable size would certainly be left in the cavity. A too small incision

[1] It were useless to state that if the integuments upon any point of the tumor are exceedingly thin, or affected with gangrene, the incision should be through the affected parts.

would have the same inconvenience, in part; therefore, the opening should be large, and made upon the part most favorable to the discharge of the fluids. Though the incision be very extensive at the moment it is practised, on account of the great distention of the integuments, it diminishes much by the retraction of the walls of the tumor after its contents are discharged. It will, besides, have the very great advantage of facilitating the extraction of the clots.

After the incision and the partial evacuation of the clots, it is very common for inflammation to be set up in the cellular tissue in which the effusion had taken place. This inflammation is to be opposed by the appropriate means; but, like M. Deneux, we should place in the first rank attentions to cleanliness, frequent washings, and injections, at first emollient, and afterwards containing a small amount of chlorine, to be thrown gently within the cavity.

3. *The Omission of Incision altogether.*—It is evident that whenever the means employed to assist nature in effecting resolution seem to affect favorably the size of the tumor, and its consistency, by which we mean its becoming more compact and solid, their employment should be continued, and cutting instruments abstained from.

§ 3. Various other Tumors.

The other tumors met with on the external parts of generation, are cancers, phlegmons, cysts in the thickness of the labia externa, together with various excrescences and syphilitic vegetations. But whatever may be the nature of these tumors, the course of the practitioner is always the same; that is, to do nothing, so long as, by their size and character, they do not oppose the dilatation of the vulva; but, in the contrary case, to puncture the cysts, to open the abscesses, and to extirpate the vegetations of degenerated parts. As to the *modus operandi* in these cases, it is too simple to require a particular description. The possible occurrence of serious hemorrhage ought not however, to be lost sight of. (See what is said on the subject, p. 519.)

Prompt action is not requisite in cases of polypus, for, unless it be very large, it will seldom offer an insurmountable obstacle to the expulsory efforts of the womb; because, when adherent to the vagina, these abnormal growths are often pressed beyond the vulva. But if their size should be deemed too great to permit delivery, the tumor might be removed.

In a case where M. Gensoul was obliged to apply the forceps, he seized the head and the fibrous body, whose pedicle adhered to the upper part of the vagina, at the same time, and brought them away together. The polypus weighed twenty-two ounces after it was extracted.

CHAPTER VII.

OBSTACLES AT THE NECK OF THE UTERUS.

The difficulties which may be encountered at the neck of the uterus are due to the following causes, viz.: adhesion of the lips, complete obliteration of the cervix, rigidity of the orifice, spasmodic contraction of the orifice, various tumors, and scirrhous or other degeneration of tissue.

§ 1. Agglutination of the External Uterine Orifice.

This is a very rare complication, and but few examples of it are reported in the books; though perhaps, as M. Nægèle remarks, from whom I extract the following details, this rarity is owing to the fact, that the various degrees of agglutination have escaped the notice of the physician; the powers of nature alone triumphing over the accident in most cases.

Its existence may be suspected when the inferior uterine segment descends low down in the excavation at the commencement of the labor, and presents no trace of an orifice; or when the latter presents as a fold or a hollow, which is slightly depressed at its centre, and very often not corresponding to the pelvic axis. The middle of this little depression is usually occupied by a filamentous web, some fleshy tissue, and a cellular network, in the centre of which a small narrow opening is found; sometimes the lips are held together by a consistent mucus. As the contractions become more energetic, the lower segment of the womb is forced into the excavation, and becomes so thin that, at the first exploration, the finger appears to be separated from the head by the membranes alone; but, notwithstanding the strength of the pains, the uterine orifice is not only tightly closed, but even seems to ascend somewhat, and to be carried towards one side. The orifice may open spontaneously under the pressure of the energetic contractions; but if it resists, and the accoucheur does not early recognize the source of the difficulty, a rupture of the womb, or a paralysis of it, which is not less dangerous, might result in consequence.

The question arises, what is the nature of this agglutination? It has probably followed an inflammation of the cervix uteri, and the upper part of the vagina; since the pseudo-membranous or fibrous tissue that composes it, is similar, says Nægèle, to that substance which serves as the bond of union between the placenta and womb, or that uniting the pleura pulmonalis to the pleura costalis, or the intestines with each other and with the abdominal wall, when an inflammation of these parts terminates by adhesion. In a case where a woman died during labor, the adhesion of the neck was found, at the *post-mortem* examination, to be so resistant that it could neither be lacerated nor broken by any moderate force, and the membrane that blocked it up was of an aponeurotic character.

The precise period at which its formation commences cannot be determined. In a woman who presented this peculiarity during labor, the orifice was patulous six weeks before her delivery.

The agglutination of the orifice has been remedied in most cases without much difficulty, the membrane having been easily ruptured either by the

finger or some blunt instrument, and the operation has generally been followed by the loss of only a few drops of blood. The index-finger should be preferred to everything else, for if this is not sufficient to break down the obstacle, we can expect but little aid from an instrument. It is really difficult to understand how this agglutination, which almost always yields to the pressure of the finger, can resist the impetus of the strong contractions of the womb.

[I have met with two cases of adhesion of the external orifice. In the first one, which occurred at the Hospital of the Clinic, I detected the condition of things whilst practising the touch during pregnancy. I was, therefore, prepared when labor came on. At first, there was considerable resistance, but when the pains became very powerful, the adhesions yielded spontaneously, and delivery was accomplished naturally. The second case was one of a first labor, to which I was called in consultation by a physician in the city. The patient had been in pain for three days without any progress being made. I became satisfied, after several very careful examinations, that there was no opening upon the lower segment of the womb, though I thought I could detect the place of the external orifice by the existence of a very slight depression there. When a pain came on, I endeavored to destroy the adhesions by strong pressure with rapid rotation of my finger. After a few fruitless attempts, I succeeded; the opening dilated rapidly, and delivery took place in a regular manner.]

§ 2. Complete Obliteration of the Cervix Uteri.

At the present day it is an ascertained fact that the neck of the womb may be entirely obliterated at the time of labor, and by adhesions too strong to be broken down by the finger. But it is an exceedingly rare occurrence, and the accoucheur must not permit himself to be deceived by a great obliquity of the cervix, rendering the orifice of difficult access, nor by an agglutination of the lips of the os tincæ, since it is possible for an overlapping of the two latter to be mistaken for an absolute obliteration of the orifice. "Several times," says Dugès, "we have found the anterior lip covered and embraced by the posterior one, which thus masked the opening, so that the finger could only penetrate it in a very oblique direction: though, when effected, this introduction afforded a means of rectifying the error promptly, and of reducing the parts to a more favorable state."

[There can be no doubt that real obliteration of the cervix does sometimes occur. It differs from simple agglutination of the external orifice only in the greater strength of the adhesion, which requires an operation to overcome it. As regards the nature of the affection, therefore, the distinction is of slight importance.

The best work we have on obliteration of the neck of the uterus was published by M. Depaul in 1860. In it are reported three cases of his own, in addition to those which had already been made public.

The external orifice is the one usually obliterated, though the internal one is sometimes affected in the same way. The diseased action producing it sometimes begins after fecundation, though it seems probable that it oftener existed before it, having already considerably contracted the opening; under these circumstances, the intervention of pregnancy gave rise to conditions favorable to the completion of the closure. An attentive study of cases leads M. Depaul to the conclusion that these complete obliterations may have their origin in violence done to the neck of the uterus in the first labor, especially when it was long, painful,

and required the use of instruments. All inflammations and other alterations of the cervix may be followed by obliteration: therefore it is that primiparæ are not exempted, though less exposed to it than those who have borne children.

When the neck is obliterated, labor begins regularly, and the pains continue for several hours or days, becoming at last less frequent or ceasing entirely. The vagina is often hot and dry, and the lower segment of the uterus, rendered thin by pressure, descends very low into the pelvis, but it is impossible to discover an opening upon it. To be sure of this, however, requires great skill in touching; the vagina should be explored throughout its whole extent, even to its insertion upon the uterus, for without this, a mere obliquity of the orifice might be mistaken for an obliteration. This error has often been committed, and cannot be too carefully guarded against.

Vaginal hysterotomy is the only available treatment. Whenever it is possible to do so, the incision should be made upon the point of obliteration, which may often be recognized by a small depression corresponding to the thinned cicatricial tissue.

The mode of operating is very simple. "In one case," says M. Depaul, "I used successfully a pair of long scissors. I prefer, however, a common bistoury, long enough for the purpose, and either rounded or pointed, and protected by wrapping in linen to within half an inch of its extremity. The blade should be conducted along the fingers of the left hand, previously introduced and applied to the part upon which the opening is to be effected. The cut should be made transversely, and about half an inch only in length, the tissues being divided layer by layer" (Depaul.)

Another method is to seize the parts to be divided with a pair of toothed forceps. Then the fold which is caused to project by drawing upon the forceps may be readily cut with straight scissors, without the least fear of wounding the child. The first stage of the operation is ended when the ovum is reached. The second stage consists in making several other incisions with a blunt-pointed bistoury and curved scissors; after which the labor is allowed to proceed as usual.

§ 3. Rigidity of the Cervix.

Rigidity of the cervix, also termed *anatomical* or *mechanical* rigidity, is far less common than spasm of the neck of the uterus, often described as *spasmodic rigidity*. In anatomical rigidity, which we are now discussing, the fibres of the cervix seem endowed with an extraordinary power of resistance, which cannot be explained by any alteration of tissue. It is a sort of passive resistance which the neck opposes to the process of dilatation. Its tissue seems dense and like a piece of leather soaked in grease. The labor continues without dilatation of the orifice, which retains a certain thickness, against which the contractions strive in vain until the woman is exhausted with her fruitless efforts. This anatomical condition of the orifice must not be confounded with a neck which continues thick, simply because the contractions are insufficient, badly directed, or lost against a mechanical obstacle which prevents the engagement of the fœtus.]

Under certain circumstances, the fibres of the uterine neck seem to possess an extraordinary degree of resistance; and although they have none of the characters we are about to indicate as appertaining to an inflammatory or spasmodic contraction, yet their dilatation is not effected. According to Dewees, this resistance of the cervix uteri is particularly apt to be met with in very young girls, or in middle-aged women in their first labors, and also in those cases in which parturition takes place prematurely.

There is one symptom that would lead us to suspect rigidity of the os

uteri, even before an examination; we allude to what is ordinarily termed the pains in the loins. These have always appeared to Madame Lachapelle to be a consequence of the rigidity of the external orifice, either from its experiencing a kind of cramp, or that, because of its having to sustain the whole force of the uterine contraction in consequence of its firmness, it suffers more than when soft and yielding.

Prolonged baths, employed from the beginning of the labor, and bleeding from the arm, if not contraindicated by the general condition of the patient, are the only measures which need be used under the circumstances.

However, as this extreme slowness appears from the beginning of the labor, that is to say, at a period in which the membranes are still intact, the life of the fœtus is by no means endangered thereby, and its only effect is to fatigue the mother greatly. Therefore, unless some dangerous complication should supervene, there is nothing to do but recommend patience. Still, if the labor should be extremely prolonged, and by its duration seem likely to endanger the life of the mother, it would be right to make a few incisions upon the lateral parts of the cervix.

§ 4. Spasmodic Contractions of the Neck.

Again, it may happen, that after having attained a considerable degree of dilatation, the cervix becomes affected with spasmodic contraction, whereby its subsequent expansion is retarded, or suspended altogether for several hours. The orifice then presents a thin, cutting edge, and is warmer, drier, and more sensitive to pressure of the finger; in short, is much more irritable than usual.

This condition, which has been designated as spasmodic contraction of the external orifice, may be confounded with the simple rigidity just spoken of, and with the natural retraction of the neck, when the presenting part of the child does not engage in its opening immediately after the rupture of the membranes. In the latter case, however, the thick, soft, and easily dilatable edges of the orifice will always enable us to avoid error. In the former case, the diagnosis is often more difficult if all the phenomena of the labor have not been watched, and the extreme sensibility of the neck, which is not generally met with in rigidity, will be the only evidence that we have a case of spasmodic contraction to deal with.[1]

This state of spasm does not generally last for a great while; but so long as it exists, the dilatation is extremely slow, and sometimes hardly takes place at all. Usually, however, the efforts of the body of the womb overcome the resistance at last, and the head of the fœtus clears the orifice; but in some cases it happens that, being no longer supported, the neck retracts immediately, and grasps the neck of the fœtus more or less forcibly, so that a new dilatation is required to allow the shoulders to pass; nor is this second dilatation as easy as might be expected.

This spasm of the external orifice may be met with in strong and plethoric

[1] Rigidity is a passive force, by which the fibres of the orifice resist the dilatation they have to undergo. Spasmodic contraction is an active force, by which the fibres contract and diminish the size of the opening previously exhibited by the return of the womb.

women, but also in lymphatic, nervous, and very irritable individuals, of a pale and relaxed fibre. In the former case, general bleeding is one of the first measures to be had recourse to, but in the latter it might prove hurtful. Under both circumstances, however, recourse may be had with advantage to emollient injections, fumigations, baths, and the administration of laudanum by clysters, or, preferably, the application of belladonna to the uterine neck itself. Chaussier, who has particularly recommended the use of this latter remedy, was in the habit of using an ointment prepared by mixing and triturating one drachm of the extract or juice of belladonna with an ounce of lard. But as the application of this ointment is quite difficult, Professor P. Dubois prefers the ordinary dry extract. He places a little pellet of it, about the size of a pea, on the nail of the index-finger, which latter is then carried up to the cervix, where, in the course of a few minutes, the heat and moisture of the parts soften the extract, which is then readily smeared over the external and internal surfaces of the neck.

The belladonna, so highly lauded by some accoucheurs, is by others thought to be useless. It seems to me that this difference of opinion has arisen from confounding simple rigidity with spasmodic contraction. Though without action in the former case, I think it very useful in the latter.

If all these measures prove unsuccessful, or if an accident, which endangers the life of the mother or child, should demand a prompt termination of the labor, the accoucheur will have to choose between a forcible introduction of the hand and multiple incisions upon the neck. (See *Difficulties of Pelvic Version.*)

[Incision of the neck, or vaginal hysterotomy, is certainly the preferable operation. To perform it, a blunt-pointed bistoury is laid upon the forefinger and conducted to the orifice, which it cuts by a conjoined sawing motion and pressure. The larger part of the blade is previously wound with a piece of linen bandage in order to protect the vagina. The multiple incisions in this case yield all their advantages, and render consecutive laceration far less probable than would a single incision. Very rarely will it be necessary to make them more than half an inch long, whilst they may be often less than this; for it is the almost universal practice to be content with cuts of from three to four-sixteenths of an inch in depth only, around the circumference of the orifice. The lateral parts of the neck should be chosen for the incisions; though, if necessary, they may be made upon the anterior lip, and lastly, upon the posterior one.

In the vast majority of cases the operation is a very simple one, though some difficulty may be encountered in the use of an ordinary blunt-pointed bistoury. In this case, a curved blunt-pointed bistoury, with a concave edge, is preferably employed.

For my own part, I choose almost always a pair of angular scissors, with blades shaped like a raven's bill. It is directed upon the finger, opened when the orifice is reached, and after one blade is inserted between the ovum and the orifice the incision is made.]

But it is not the external orifice alone which may retard the delivery of the fœtus by retracting on its neck, for very often the internal one, or rather that portion of the uterine walls which corresponded to it in the non-gravid state, retracts forcibly on the neck of the child, even before the head has cleared the external orifice; so that the latter, being retained in the portion

of the organ that appertains to the neck after delivery, can advance no further. This internal contraction only takes place where the waters have escaped for some time, and it evidently results, as Dewees has remarked, from the double tendency of the womb to regain its primitive form, and to accommodate itself to the shape of the parts contained within its cavity.

There is every reason to suspect that the delay in the progress of the head is dependent on this cause, when, notwithstanding the energy of the pains and the absence of all other sources of dystocia, it is found to make no advance at all, or, even if it approaches the vulvar orifice during the contraction, it returns to its primitive position immediately afterwards. Besides which, if the finger is slipped above the head, the latter will be found free in the excavation; but one of the orifices (the internal one, most usually,) will be strongly retracted around the neck.

Bleeding, general bathing, and laudanum injections may be employed usefully under these circumstances also, though it sometimes happens that the contraction of the internal orifice persists notwithstanding. Under these circumstances, should version be judged necessary, the most serious difficulty may be anticipated in passing the hand through the retracted part; and if the application of the forceps be deemed requisite, as it would be if the head were already engaged, but delayed by the retraction of the internal orifice, this latter circumstance, by arresting the shoulders, would render the delivery impossible. It is then we must have recourse to the measures so much vaunted, and so often employed by Dewees with success, namely: to bleeding in the arm, pushed *ad deliquium animi*. But, in order to avoid drawing too great a quantity of blood, the patient should be directed to stand up, if possible, and, as soon as fainting occurs, she is to be replaced on the bed; when, according to the American accoucheur, the relaxation in the retracted orifice, produced by the syncope, will be such that the pelvic version, or the extraction of the head by the forceps, can always be performed. Finally, in those cases where the woman's general condition does not permit a resort to blood-letting, we may employ the opiates in a full dose, either by the mouth or by injection, with great advantage. The inhalation of chloroform may also prove very useful.

The reader will also understand that, in a natural labor by the pelvis, the retraction of one of these orifices may likewise arrest the head. Under such circumstances, if the source of difficulty is confined to the external one, numerous incisions might be made in the ring of the os uteri; but if it is at the internal orifice, Dewees' plan should certainly be followed. It is likewise important to ascertain at once whether the child is still living; for though it be difficult to admit that a strangulation of the fœtus can occur from direct pressure, yet it is not the less true that the umbilical cord, from being nearly always compressed in these unfortunate cases, exposes the child to a speedy death; and if the infant is already lost, we may employ, beneficially, either belladonna, or the opiates internally, according to the orifice retracted.

In cases of this kind, the use of anæsthetics might prove serviceable, by producing relaxation of the partial spasm of the uterine fibres. M. Dubois has administered them with advantage, as is shown by an example given in

the excellent thesis published by Dr. Tissier on the subject. (*Paris Theses*, 1860.) In all cases, chloroform should be tried before having recourse to bleeding to syncope.

§ 5. Obliquity of the Orifice.

In consequence of the usual direction of the uterus, the neck is slightly turned downward and backward. The posterior obliquity may, in some cases, be much greater, whilst in others the orifice may be directed strongly forward, or toward one of the sides of the pelvis. When treating hereafter of malpositions of the body of the womb, we shall have occasion to speak of the effect of retroversions and lateral obliquities upon the direction of the neck. We would treat at present of the posterior obliquity of the orifice, which is by far the most frequent.

The posterior obliquity of the neck may be due to an extreme anteversion of the body of the organ, though it may also be very well marked, even when the fundus of the womb projects no farther forward than usual. This deviation of the orifice may also take place during labor; but it may also exist in the latter stages of pregnancy.

In the former case, the obliquity is due to the fact that the dilatation of the orifice is effected more at the expense of the posterior than of the anterior lip, and, consequently, the plane of this opening would naturally be found, in most cases, behind the long axis of the organ. Wherefore, this irregular dilatation may, independently of any deviation in the fundus, produce such an obliquity of the neck, that the plane of its orifice, instead of being horizontal, has very nearly a vertical direction; that is, the opening looks directly towards the anterior face of the sacrum, its anterior margin has become inferior, and its posterior one is now the superior. When existing before the commencement of labor, its mode of production is altogether different. We know that in vertex presentations the head of the fœtus engages in the excavation in the latter months, pressing the lower part of the uterus before it. Now, in the normal direction of this organ, it is evident that the head must press more especially upon the portion anterior to the orifice, which anterior portion it must carry before it. Hence, it is plain the external orifice of the neck must necessarily be situated altogether posterior to the projection formed by the head in the lesser pelvis.

But whatever may be the manner and time of its production, its effect upon the progress of the labor is always the same. Consequently, when the child's head is urged on by the uterine contractions, it presses the anterior inferior wall of the uterus before it, and thereby evidently retards the delivery. In fact, the dilatation of the neck must necessarily be very slow and imperfect; besides, the expulsive efforts are spent against the anterior part of the cervix, which part, corresponding to the void in the pelvis, and being distended by the head, is sometimes forced down nearly to the vulva, and threatened with a rupture. Most generally, there is time for rectifying this unfavorable situation of the cervix; nevertheless, the patient must remain in bed as much as possible; for it is very apparent that, in the erect position, the body of the womb constantly augments this posterior obliquity

in the neck by being carried forwards. The termination of the labor may also be facilitated by placing the orifice in its natural position with the finger; this is done, during the interval, by hooking the anterior lip, and carefully bringing it to the centre of the vagina, and then sustaining it in this position until a new contraction comes on; when the head is forcibly pressed down and engages in the opening, and no longer permits the lip to regain its abnormal position. The labor is sometimes speedily terminated after this little manœuvre.

It occasionally happens that the cervix uteri is well dilated, though not as yet sufficiently so to permit the parietal protuberances to traverse it; and this condition of things lasts for a considerable period, notwithstanding the long and acute sufferings of the patient. In such cases, the engagement of the head may be singularly facilitated by making a slight pressure on all the periphery of the orifice with the extremity of the index-finger, carried rapidly around it.

Again, the dilatation may often be completed and the head be down in the excavation, but notwithstanding the expulsory efforts of the womb, it is retained there by the anterior lip of the neck, which is pressed before it; the head cannot overcome the resistance thus made by the band formed by the anterior lip, and several hours may elapse without any advance in the progress of the labor. When this happens, the following course should be adopted in order to promote a prompt engagement at the inferior strait: taking advantage of an interval, the accoucheur hooks the anterior lip with his finger, and draws it towards the symphysis pubis, where it is retained until the pain comes on; then the extremity of the finger, placed under this portion of the neck, pushes it above the descending part of the head, until it gets beyond the occipital boss; when the occiput is found to engage almost immediately in the pubic arch, and the labor terminates two or three hours sooner than it would have done without this little manipulation. It is occasionally necessary to repeat these attempts several times; but as they are attended with no inconvenience when properly performed, they may be renewed without fear. We will add, that the most favorable period for this purpose is that when the head, after having reached the pelvic floor, is on the point of clearing the inferior strait, provided the pains are energetic, and the cervix sufficiently dilated to permit the passage, if the axis of its orifice were parallel to the axis of the head.

§ 6. Swelling and Elongation of the Anterior Lip.

It is not at all unusual to find the head descending in the excavation long before the complete dilatation of the os uteri, whereby the anterior lip is necessarily compressed between the former and the symphysis pubis. As a general rule, this compression, and the consequent pain, disappear on the prompt termination of the labor; but if the latter be prolonged, and especially if the pelvis scarcely reaches its normal dimensions, the compression is very severe, a considerable tumefaction will result in that part of the anterior lip found below the constricted point. Duclos, of Toulouse, has met with three instances of this kind, two of which were in the same woman; M. Naegele has published another, Dr. Lever two more, and M. Danyau one

making seven in all. M. Blot mentions a case in which the tumor formed by the anterior lip was an inch and a quarter thick, and forced down to the vulva. The labor had to be terminated by the forceps.

The following case is one of those reported by Duclos: A woman, thirty-four years of age, who was in labor with her fifth child, was suddenly attacked, after twenty-four hours of moderate pains, by acute sufferings, which called forth loud cries; an elongated body appeared between the lips of the vulva, and its apparition was accompanied by a slight hemorrhage, pallor and feebleness. On his arrival, he found a cylindrical tumor projecting four fingers' breadth beyond the parts; it was two inches broad near the vulva, and was irregular, resistant, and of a wine-like color. After a careful examination, he ascertained that it was formed by the elongated and tumefied anterior lip of the cervix. He first thought of applying the forceps on the child's head, but afterwards concluded to aid its delivery by drawing on the occiput, and operating on the forehead by means of the index-finger previously introduced into the rectum. In the cases observed by Nægele and Danyau, as also in one of the women reported by Lever, the labor terminated spontaneously. There is, therefore, nothing to be done in most instances; though if the tumor be of large size, very tense and black, and apparently threatened with gangrene, the example of the English surgeon just named might be followed; that is, to make a number of punctures, for the purpose of evacuating the infiltrated liquids and diminishing its volume.

On the whole, then, I may remark, with M. Danyau, that this species of tumefaction can scarcely be considered as a mechanical obstacle to the delivery; and that the unusual length of the labor must rather be attributed to the extreme pain it occasions, and to the disorder and irregularity of the uterine contraction caused thereby.

The cases recently mentioned by M. Montgomery under the name of *thrombus of the lips of the cervix*, and which will soon be described (see page 705), are evidently instances of this affection. The observations of the Irish accoucheur appear to us similar to those just mentioned. As regards the prognosis, however, it is important to distinguish simple infiltration from a true effusion.

M. Montgomery thinks that this condition of things might be mistaken for a case of insertion of the placenta upon the neck, the tissue of the infiltrated lip bearing considerable resemblance to the placental tissue. Still, as he observes, it may always be readily ascertained that the tumor is not only applied to the internal surface of the womb, but that it is also situated in the substance of the latter. The finger can never be made to penetrate between the tumor and the internal surface of the uterus.

§ 7. Abscesses in the Lips of the Cervix Uteri.

Genuine abscesses are occasionally developed in the substance of the lips of the os tincæ, which, independently of the unfavorable influence they may have over the gestation, must necessarily disturb the regular progress of the labor; because, where they invade a considerable portion of the neck, its dilatation is thereby rendered very slow and very painful; besides which, their size may be so great as to retard the passage of the head. The reader

will find in Bonet (*Sepulchretum*, vol. ii., lib. iii., sec 38, Obs. 2) the history of a woman who died without having been delivered, after five or six days of suffering, in whom a large abscess, filled with putrid pus, and occupying the neck of the womb, was found at the *post-mortem* examination.

If the presence of fluctuation should establish the diagnosis, the proper course would evidently be to incise the tumor.

§ 8. Sanguineous Tumors or Thrombus of the Lips of the Neck of the Uterus.

We have already seen that the anterior lip of the cervix sometimes becomes considerably swollen during labor, and that the swelling may sometimes be occasioned by an infiltration of blood. This infiltration, which may become a mechanical obstacle to the expulsion of the head, is certainly the first degree of a much more serious accident; for the blood, which is merely infiltrated at the outset, may, by separating the meshes of the tissues of the neck, collect in a cavity, which, by opening afterward in the same way as the thrombus of the vulva, may give rise to mortal hemorrhage. A case of this kind was communicated to the Obstetrical Society of Dublin by Dr. Johnson, and its character was so remarkable as to justify our giving a short analysis of it.

A woman, who had already given birth to six children, was delivered for the seventh time, after four hours of easy labor. The child presented by the breech. The after-birth came away without difficulty, and the patient was perfectly well for the first three days; about the fifth day, however, she was seized suddenly, and without any apparent cause, with profuse flooding.

The uterus was thoroughly contracted, and yet, notwithstanding the employment of the most appropriate means, she died in about an hour and a half. All the abdominal and thoracic organs were found, at the autopsy, to be perfectly healthy. The uterus was well contracted, but upon the left side of its neck, at about an inch from its orifice, there was discovered a rupture, with irregular and blackened edges. This opening, which was large enough to permit the easy introduction of two fingers, conducted into a cavity formed in the substance of the neck, large enough to contain a small orange. Five or six open vessels, of a size sufficient to admit the introduction of a small bougie, were observed upon the internal surface of the cavity, and were proved by insufflation to communicate with the uterine sinuses. "A careful examination of the specimen," says Mr. Montgomery, "convinced me that it was a case of thrombus, whose external envelope formed a thin layer of the uterine tissue, became gradually thinner, and finally ruptured. The fluid and coagulated blood escaped through the rupture, and the hemorrhage continued." *Dublin Quarterly Journal*, 1851.

The thrombus is, in all probability, developed during labor, under the following circumstances. When the neck is half dilated and the waters discharged, the anterior lip is found to swell, thicken, project, and descend beneath the presenting part, usually the head, to the disengagement of which it sometimes presents an insurmountable obstacle. An infiltration of blood, which may become converted into a sanguineous collection, is soon formed in the substance of the lip. The cavity increases in size, until its walls rup-

ture and give rise to hemorrhage. The discharge may then take place during the labor itself, though far more frequently it does not appear until some time after delivery. In the latter case, it is more likely to prove dangerous, as the complete retraction of the uterus makes it difficult for the accoucheur to divine the true cause.

The introduction of a tampon into the vagina is certainly the most useful measure that can be employed.

§ 9. Fibrous Tumors and Polypi of the Cervix.

Besides the indurations, the œdematous swellings, and the cancerous degenerations affecting the cervix uteri, which will be described in the following paragraphs, there are certain tumors, which, though filling up the excavation, really have their origin or seat in the proper tissue of the neck; others, that arise from the body of the womb, to which they still adhere by a long pedicle, are found hanging down into and obstructing the cervix.

A. *Fibrous Tumors of the Cervix Uteri.*—These tumors may be developed in the neck as well as in the tissue of the uterine walls. In a case described by Madame Lachapelle, the pelvic excavation was almost entirely occupied by a tumor that seemed inclosed in the lateral and posterior portions of the neck; it was as large, she states, as the head of a fœtus at term, and would have been the more likely to deceive an inattentive person, from the fact of its presenting a depression similar to a fontanelle. The child was very small, and had been dead for a long time; so that, notwithstanding the size of the swelling, it was enabled to flatten it down and pass through the narrow passage that still remained free. Madame Boivin and M. Dugès found, when making a *post-mortem* examination of a woman who died of peritonitis, after a very painful though natural labor, a fibrous body about the size of the fist in the substance of the neck; the child had a fractured cranium, and was still-born. In another case of the kind, Ramsbotham was obliged to resort to embryotomy; but the woman recovered.

M. Danyau reported to the Academy (1851) a case in which he was much more fortunate, for he succeeded in enucleating a tumor of considerable size which had been developed in the posterior lip of the cervix. Encouraged by the idea that, although he might not be able to remove it altogether, he might, at least, extirpate a portion large enough to give passage to the fœtus, he determined to operate, and was successful in bringing it away completely. The appearance of the tumor was precisely that of a fibrous tumor of the uterus; it weighed about twenty ounces, and its greatest diameter was six inches. When enucleated completely, the tumor was drawn down, but could not be extracted until after it was divided into two parts.

I was called, in February, 1853, to take charge of a young woman at term in her third pregnancy, and whose waters had been discharged four days previously.

Upon practising the touch, I was astonished to find the excavation filled by a tumor apparently of the size of a full-grown fœtal head. At first I was unable to discover the orifice of the womb, and it was only by carrying the finger very high up in front and to the left, that I succeeded in introducing the index into something like the finger of a glove, which appeared

to me to be the cervix retaining its full length. Penetrating still deeper, I at last reached the internal orifice, above which I distinguished the fœtal head.

What, now, was the nature of the great tumor which had thus turned the neck aside, and prevented the effacement that it should have undergone during the last few weeks of gestation? Where, also, was it situated?

My first hope was, that it would prove to be merely an exaggerated anterior obliquity of the neck, and I asked myself, whether what sometimes happens to the anterior lip, had not occurred in the present instance to the posterior one, and whether the latter, forcibly depressed by the fœtal head, did not alone form the tumor which filled the excavation. But the tumor had a peculiar consistence and apparent fluctuation, by no means resembling the hardness of the head, besides which, the hypothesis did not explain the persistence of, and the increased length of the neck. A fresh examination induced me to conclude that a solid tumor had become developed in the substance of the neck.

The waters had continued to discharge for the past four days without any pain, and I resolved to wait. The next day, the condition of things remaining the same, I requested M. Dubois to examine the patient.

A long investigation induced M. Dubois to suppose that a cyst containing fluid had formed in one of the lips of the orifice, and therefore he recommended waiting, and finally puncture, if the tumor should appear to present an insurmountable obstacle, after labor had continued for a certain time.

At first I did not coincide with this diagnosis, but it also seemed to me wisest to wait for the pains. The latter appeared decidedly on the evening of the next day, five days after the membranes were ruptured; they continued all night without effecting any change either in the tumor, or in the situation or length of the neck. To clear up the diagnosis, I introduced the entire hand into the excavation, and grasping the whole tumor, I declared joyfully to my friend, M. Parchappe, that I had been deceived, that M. Dubois was right, and that, most happily, we had to deal with a cyst.

With a long trocar, of at least an eighth of an inch in diameter, I made a puncture, but to my great surprise nothing escaped. I endeavored to remove obstructions from the tube, if there were any, but in vain; nothing appeared.

My sensations were so decided, and so convinced was I that I had to deal with a cyst, that I had no hesitation in puncturing anew; but the same result followed, and I was obliged to relinquish the idea.

M. Dubois being absent, I requested my professional brother and friend, M. Danyau, to assist me with his advice. I related to him all that had passed, and insisted especially upon the result of my two punctures, but notwithstanding all this, M. Danyau, after examining the patient, was convinced of the existence of a cyst. He made two successive punctures, but not a drop of fluid escaped. There was no avoiding the conclusion; it was not a cyst.

What, then, was to be done? We could no longer hear the pulsations of the fœtal heart. After proving our incapacity of making an exact diagnosis of the nature of the tumor, we thought that its soft and apparently fungous

character would enable us to incise it throughout its extent, and thus create a passage to the fœtus, which we then might extract. The tumor was therefore divided into two lateral parts, and we were able to reach the head.

The forceps were at first applied with much difficulty, but notwithstanding the diminution that the tumor had undergone, it obstructed the entire excavation, and rendered the extraction of the head impossible. Craniotomy and the application of the cephalotribe forceps were equally unsuccessful.

Blood flowed freely from the incised tumor, the patient was pale and prostrated, and the uterine contractions became weaker and weaker. But a single feeble hope remained, namely, pelvic version. It was performed immediately, and the trunk of the fœtus, bringing with it the entire tumor externally, enabled us at last to extract the child.

The operation had lasted two hours, and the unfortunate lady was exhausted. Before extracting the placenta, ergot was administered, the uterus rubbed, and the after-birth was expelled almost spontaneously. Notwithstanding all our precautions, and the use of all kinds of tonics and stimulants, some blood still escaped from the womb, which in a patient already exhausted by the hemorrhage from the operation, was sufficient to cause a fatal termination. She died about half an hour after her delivery.

The autopsy showed that the tumor, which was larger than the head of a child at term, had formed in the *anterior lip* of the cervix. By its weight, which was considerable, it had during life so twisted the neck around, as to bring the posterior lip in front, which explains the situation of the orifice, as the seat of the tumor accounts for the persistence of the length of the neck, notwithstanding the progress of gestation.

The tumor was constituted of a soft and spongy tissue, resembling rarefied placental tissue, the meshes of which circumscribed numerous cavities, in which no fluid was to be found. No abnormal element could be discovered by the most careful examination, no newly-formed pathological product; it was simply an enormous hypertrophy of the tissue of the neck. Such was the opinion of several professors who examined the specimen at the School of Medicine.

There is every reason to believe that this tumor was developed during the last pregnancy, for, eighteen months before this last delivery, I attended her on account of a miscarriage, and did not at that time detect any anomaly either of structure or form affecting the neck.

[The preceding example shows how difficult the diagnosis may be in such cases. To avoid error, it ought to be borne in mind that fibrous tumors of the uterus often become softened during pregnancy to such a degree as wonderfully to resemble those containing liquid. I have already met with several examples of this kind. The softening should be seriously considered as regards the prognosis, as it facilitates the flattening of the tumor. Thanks to it, the fœtus has sometimes been known to engage in the pelvis by the side of a tumor which at first seemed as though it would render delivery impossible. I witnessed one of these unlooked-for terminations in connection with Dr. Franquet, a patient of whom had a tumor of the neck and lower segment of the uterus descending into the cavity of the pelvis and occupying one half of its area. In the case of this woman, it might very well have become a question whether the Cæsarean operation should be performed. She was, nevertheless, delivered at term of a living child which presented by the breech.]

These examples show what may be feared or hoped for in such cases. Thus, we should wait when the tumor is very small and so situated as to correspond with one of the large diameters of the pelvis, or extirpate it, if the bistoury can reach it without danger, which seldom happens; on the other hand, where its size no longer permits us to attempt the extraction of a living infant, to resort to embryotomy; and, if the excavation is completely obstructed, to open a passage for the child by the Cæsarean operation.

B. *Polypi*, or fibrous pediculated tumors, whether attached to the neck or body of the womb, obstruct delivery only at the cervix. On this account both are treated of in connection. They are not so serious as the preceding tumors, inasmuch as they can generally be extirpated, although their size would seem to render them an insurmountable obstacle to delivery.

As a general rule their diagnosis is readily made out, though several singular errors on this head are recorded by authors; for example, Dr. Merriman relates a case in which an experienced physician mistook a polypus for the head of a child; and Smellie furnishes two similar instances; consequently, we must not trust to a superficial examination.

The influence of uterine polypi over the progress of labor will be modified by a number of circumstances; thus, when the tumor is small, it may be compressed against one of the walls of the excavation by the child's head, and the latter then passes before it; or, where the pedicle is very long, the fibrous mass is pushed by the head entirely out of the vulva, and therefore only retards the fœtal expulsion in a slight degree. This occurred in a case reported by Dr. F. H. Ramsbotham; who says, "I was summoned to a woman in labor, and found a tumor of the size of a goose's egg hanging in the vagina. (Fig. 109.)

"I had no difficulty in determining it to be a polypus, whose pedicle was attached to the internal wall of the organ above the neck. Dilatation took place rapidly, and the membranes ruptured; then, in less than an hour, the head, urged on by powerful contractions, forced the body of the polypus outside of the vulva and became disengaged." (*Obstetric. Med. and Surg.*, p. 237.)

Fig. 109.

After having consulted with his father, whether it was advisable to remove the polypus at once, the question was determined in the negative.

In many cases, therefore, we may trust to the resources of the organism, remembering at the same time, that too great a delay is not without danger both to the mother and child; and, where the inefficiency of the uterine contractions has been fully ascertained, a division of the pedicle appears to us to be the only resource. If the subsequent extraction of the tumor is rendered very difficult by its volume, it might be cut up into several pieces, as I have seen done on two occasions, or be firmly grasped with a small serrated forceps. Pelvic version, which is recommended by some authors, could be performed in those cases only in which the length of the

pedicle gives great mobility to the tumor, and allows it to be pushed above the superior strait. It is unnecessary to add that, if the existence of this tumor in the canal be ascertained during the latter months of gestation, it should be excised immediately, if it be of sufficient size to render the parturition difficult or tedious.

§ 10. Fungous, or Cauliflower Tumors, &c.

These tumors, which resemble a cauliflower in their appearance, may arise from either lip of the womb; and then by acquiring a considerable size, they mask the orifice and render it nearly inaccessible. As they often give rise to hemorrhage, and as the spongy tissue that constitutes them has some analogy with the placental structure, they have occasionally been mistaken for a placenta prævia. Both Madame Lachapelle and Denman relate errors of this character; and I witnessed the following still more singular case. The internes of the Lourcine Hospital sent for M. Nelaton, who was surgeon to the establishment, to turn in a supposed case of hand presentation. M. Nelaton desired me to accompany him; and, on our arrival, we ascertained that these young gentlemen had mistaken an enormous cauliflower excrescence, that sprung from the anterior lip of the cervix uteri, for the hand; its pedicle was at least an inch and a half long, and its base presented five or six little vegetations that had been mistaken for the fingers.

It frequently happens that these tumors are small enough to admit of the child's spontaneous delivery; indeed, such was the fact in the case just mentioned; but there are many others where the accoucheur is less fortunate. Take, for instance, the seven cases reported by Puchelt; in one of which it was necessary to make incisions upon another part of the hard and scirrhous neck, so as to secure the introduction of the hand, and in a second, to remove the tumor, that was attached to the anterior lip and occupied all the vagina, by the scissors; gastrotomy was resorted to in a third, on account of a rupture of the womb, and not even the child was saved; in another, the extraction of the child was impossible, notwithstanding the perforation of the cranium, and the woman died before delivery. Only a single mother survived.

§ 11. Encysted Tumors.

Adhering to the cervix uteri, or to the vaginal walls, they may also exist in the excavation. As a general rule, they are rounded, well defined, movable, elastic, yielding a little under a moderate pressure, and sometimes fluctuating; the mucous membrane covering them remains unaltered. A small puncture, in the way of exploration, will always dissipate any doubts concerning their true nature, especially if containing a liquid; and where they inclose a solid, cheesy, or fatty matter, some portions of it will adhere to the canula.

An attempt should be made to push the tumor above the superior strait, before the head becomes engaged; and the membranes must be ruptured early, so as to determine the engagement of the fœtus. In the opposite case, it will be requisite to evacuate the liquid by a simple puncture, or even to make an incision large enough to allow the contents to be pressed out

§ 12. Induration, with Hypertrophy of the Cervix Uteri.

This affection is more frequently observed in the anterior than the posterior lip, though it may affect both; but in no case has the volume of the indurated part been great enough to impede, mechanically, the expulsion of the child; but the alteration very often retards the dilatation, and sometimes even renders it impossible. Venesection and tepid bathing may be resorted to with advantage. Certain English practitioners highly extol the use of tartar emetic, given in nauseating doses, but I have not had an opportunity of testing its efficacy. If these means prove ineffectual, or if some more grave complication requires the prompt termination of the labor, we might have recourse to repeated incisions made on the neck of the womb.

§ 13. Of the Cancerous Neck.

Like all the organs of the economy, the cervix uteri may be affected with scirrhus, or may form an encephaloid tumor; and when this does take place the prognosis is very unfavorable, both for the mother and child. For example, of twenty seven females reported by Puchelt, five died during the labor, nine shortly after delivery, and but ten recovered; the fate of the other three is not stated. However, if the disease is still in its first stage; if the patient's general condition is not seriously altered; and especially if the malady has made but little progress, or the tumor is small, the danger is not so imminent, and the expulsion of the child may then take place regularly. But even where the delivery is effected spontaneously, its influence over the subsequent progress of the tumor is not the less disastrous; for the pressure to which the diseased part is exposed seems, in most cases, to hasten its development; and, whether the labor be terminated naturally or by the resources of art, its progress afterwards is much more rapid. The child, likewise, is very often lost in the cases under consideration; thus, of the twenty-seven women above cited, fifteen were delivered of a still-born child, and ten only of a living infant; nothing is said of the fate of the other two.

The indications for treatment, when the cervix uteri is affected with cancer, will necessarily vary, according to the seat and size of the tumor; for, if it is not very voluminous, or if it is located on the posterior lip, or the pelvis be of large dimensions, there is every reason for hoping that the efforts of nature will prove adequate to the dilatation, and the expulsion of the fœtus.

I have seen the former process effected at the expense of the sound anterior lip, where the other was invaded by a cancer throughout, which also extended to the posterior vaginal wall.[1] Wherefore, there is no occasion

[1] This case appears to me too remarkable not to be reported, at least in a condensed form.

A female aged forty five years, who had previously had several children, came to the "Clinique" about the commencement of the last month of her gestation, when, by resorting to the touch, it was ascertained that the posterior vaginal wall was occupied throughout by an elongated tumor, which was curved in a crescentic form, and extended from the posterior lip of the cervix, to within a finger's breadth of the vulva. The lip was nearly an inch thick in all its transverse extent (which latter was

for immediate action; although it must not be forgotten that, if the degeneration of these parts is more extensive, the powers of nature alone are nearly always inadequate to the accomplishment of the delivery.

Some authors have recommended copious bleedings; but sanguineous emissions, though advantageous in cases of rigidity, or of simple induration of the neck, would here only enfeeble the patient without producing any change in the condition of the orifice; and the only available resource of our art is still in the repeated incisions on the periphery of the cancerous mass; because turning, and the application of the forceps, which have been advised by certain accoucheurs, are evidently only practicable where the bistoury may have previously facilitated the entrance into the womb. Without this precaution, one or more fissures dividing the lobes of the scirrhus would naturally result from the introduction of the hand or instrument, which, at the moment of the head's passage, would extend still further, and encroach perhaps on the body of the womb. Or, if the fissures should not form, the neck, by not dilating, would create an obstacle to the delivery, and the patient would be exposed to a rupture of the organ, to convulsions, and to all the consequences that attend labors rendered difficult by mechanical impediments; unless, indeed, there happened to be a rupture of the subvaginal portion of the womb itself, and the child's passage was effected through this accidental orifice.

Lastly, in those cases where the application of the forceps is still impossible, even after the incisions have been made, a grave question is offered for our solution. Supposing the child is still living, we have only to choose between its mutilation and the Cæsarean operation. Though this last operation be serious under all circumstances, it nevertheless seems preferable here to the first, because it affords a considerable chance of saving the child; and the mother's life is already so greatly compromised by the disease with which she is affected, that we should not, in my estimation, hesitate to sacrifice all to the safety of her infant.

more considerable than usual), and it had contracted adhesions with the vagina by its posterior face. The tumor presented nearly the same thickness in all parts; its anterior surface was irregular and nodulated, as was also the posterior lip of the cervix uteri: but its hinder surface adhered to, or rather was confounded with, the recto-vaginal septum. When this woman arrived at full term, the labor began, and the dilatation was effected very slowly, though completely, at the expense of the anterior lip. The tumor whose volume seemed to offer an insurmountable obstacle to the delivery, only rendered the second stage of the travail a little more tedious than usual; for, being pressed back by the child's head, it became nearly transverse in the excavation, and formed on the perineum a pad, or a kind of crescent, the convexity of which looked downward, but its concavity was directed upwards, and arrested the head; finally, under the influence of the powerful contractions, the head pushed the tumor still more backwards, by forcibly depressing the perineum, and then passed in front of it, and soon cleared the external parts.

Fig 1.

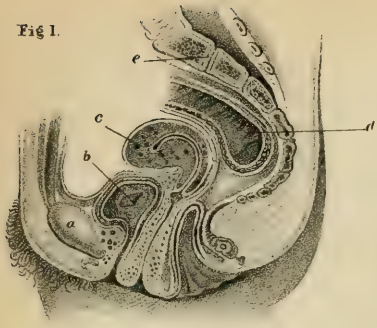


Fig 2.

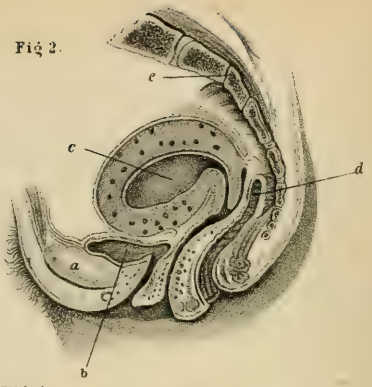


Fig 3.

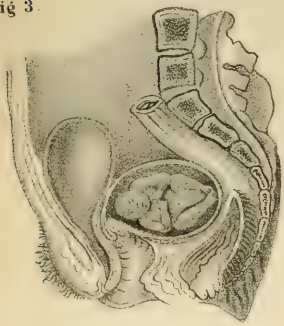


Fig 4

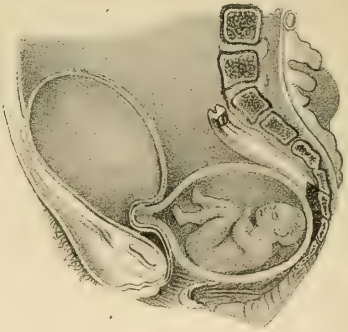


Fig 5.

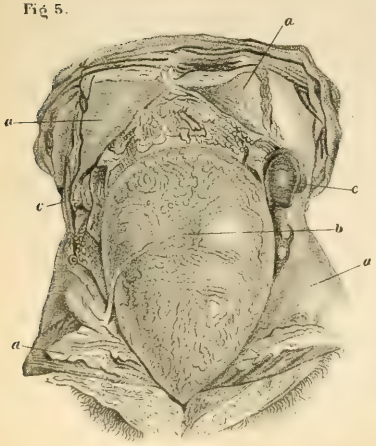


Fig 6.

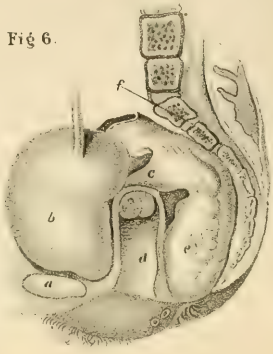


PLATE VIII.

FIG. 1.

Marked Anteflexion of the Uterus.

FIG. 2.

Anteflexion of the Uterus soon after Delivery.

FIG. 3.

Retroversion of the Gravid Uterus at the Fourth Month (Diagrammatic).

FIG. 4.

Retroversion at the Commencement of the Fifth Month, with considerable distention of the Bladder.

FIG. 5.

Distention of the Bladder by retained Urine, consequent upon Retroversion of the Uterus.

FIG. 6.

Retroflexed Uterus bound down to the Rectum by Exudation Membrane.

CHAPTER VIII.

OBSTACLES DEPENDENT ON THE BODY OF THE WOMB.

§ 1. Of Uterine Obliquity.

When studying the phenomena of gestation, we enumerated the various causes that forced the uterus to depart more or less from the direction of the pelvic axis; and we demonstrated that, under the influence of those causes, the womb very often inclines forwards and to the right during the latter months of pregnancy. It is not, therefore, of this right antero-lateral inclination we are about to speak, in treating here of uterine obliquity as a case of dystocia; because, where it is slight, and where it may be considered as a normal result of the development of the womb, it affords no obstacle to the parturition; but when the obliquity is more extensive, it may impede the spontaneous expulsion of the child, and will, therefore, claim our attention.

Deventer, and most of the writers on this subject since his day, have described four varieties of it, namely, the anterior, the posterior, the right lateral, and the left lateral obliquity. But the modern accoucheurs, such as Baudelocque, Gardien, Desormeaux, and P. Dubois, believe that a posterior obliquity cannot take place; for the prominence of the sacrum and of the lumbar vertebræ, they say, prevents the uterus from being carried backwards; however, from the facts reported by Deventer, Levret, Merriman, Dugès, and Velpeau, we feel warranted in still retaining these four varieties.

1. *Of the Anterior Obliquity.*—As a natural result of the resistance presented by the posterior abdominal plane, the womb inclines forward, where it only encounters the abdominal muscles, which form a soft and an extensible wall. When this obliquity is inconsiderable, the physician has only to remain a simple spectator of the efforts of nature; but when it exists in a higher degree, it becomes a source of annoyance and pain during the latter months of gestation that demands attention; and it also gives rise to difficulties in the course of the labor that should either be prevented or corrected.

An unusual inclination of the plane of the superior strait, or a well-marked laxity of the abdominal walls, favors the obliquity; and where this laxity is carried to an extreme, the ventral muscles gradually relax and yield, the womb inclines more and more forwards and downwards, its fundus gets above the pubis, and then falls anteriorly, like an inverted sack, on the thighs. This displacement has been designated as the *ventre en besace*, and by the Latin authors it is described under the name of the *venter propendulus*. This displacement gives rise to acute pains in the groins, in the fore part of the thighs and loins, when the abdomen is not supported by a proper bandage during pregnancy; and, at the time of labor, the cervix uteri is carried so far back against the anterior face of the sacrum, that it dilates with the greatest difficulty; and if the membranes be prematurely ruptured, or if the pelvis is unusually large, it nearly always happens that the child's head presses the anterior inferior part of the uterine wall before it; which part appears at the vulva while its orifice is directed considerably upwards and backwards. But if the pelvis be small, this engagement of the head does not take place, and the anterior uterine wall is then forcibly compressed

between it and some portion of the superior strait. The enormous distention in the former case, and the pressure on the lower part of the uterus in the latter, expose this portion of the organ to laceration or gangrene. Under such circumstances, the abdominal exploration and the vaginal touch can alone explain the cause of the difficulties and pains which the patient experiences. The obliquity in the body is readily recognized by the external examination; and if the head be engaged in the excavation, the finger introduced into the vagina will find a voluminous, smooth, and rounded tumor, filling up the whole cavity of the lesser pelvis, and upon which no opening similar to that of the cervix uteri can be detected; but when carried further upward and backward towards the sacro-vertebral angle, it will reach (though at times with great difficulty) the anterior border of the cervix; but, most generally, it will be impossible to recognize the posterior lip. This circumstance has several times been mistaken for imperforation of the womb, or a complete obliteration of the neck, and, as a consequence, the vaginal Cæsarean operation has occasionally been performed, where nothing more than an obliquity of the uterus was to be remedied. If the head has not yet engaged, the tumor will not occupy the excavation, but the same difficulty will still be experienced in finding the cervix. Both of these modes of exploration should be employed; for we have already learned (p. 702) that the cervix may be oblique, while the body retains its natural position; and it is evident that, under such circumstances, a resort to the touch alone might lead us to suspect an obliquity that did not really exist; and, on the other hand, the internal exploration would guard against the errors that the deformed appearance of the woman's abdomen might possibly make us commit; for it alone can enable us to distinguish the obliquity from that deformity already alluded to, under the name of anteflexion, in which the womb is shaped like a retort. In the former case, the cervix will be detected high up towards the posterior plane of the pelvis; in the latter, on the contrary, it will correspond to the centre of the excavation, notwithstanding the great forward inclination of the body of the womb.

2. *Of the Posterior Obliquity.*—This variety of obliquity (which is denied, as above stated, by most modern authors) must be attributed to an excessive resistance on the part of the abdominal walls, which prevents the uterus from following the direction of the axis of the superior strait, when it rises out of the pelvis; that is, from inclining forwards, and therefore it is almost exclusively met with in women bearing their first child.

The direction of the uterine axis is not to be judged of in reference to the axis of the body, but to that of the superior strait. Now, it is undeniable that the womb, in some cases, instead of being directed from above downward and from before backward, has its long axis directed from behind forward, and sometimes even in a direction parallel to the plane of the superior strait, so that, while its fundus reposes on the posterior inferior plane of the abdomen, its neck is situated above the pubis.

[Deviation of the orifice toward the pubis undoubtedly takes place in a certain number of cases. We admit willingly, however, that instead of regarding it as due to obliquity of the uterus, it were better explained as produced by an irregular development of the organ, whose posterior half was extremely depressed, the anterior portion having resisted.]

I cannot better describe the signs appertaining to this particular obliquity than by relating a few examples of it; and these citations will have the further advantage of verifying the fact, and of establishing its possibility.

I have twice had, says Merriman, from whom I extract the following case, an opportunity of observing this singular and unusual position of the uterus, in which the os uteri is carried so far above the symphysis pubis that it is inaccessible to the finger, and the posterior part of the pelvis so completely filled by the body of the womb that it is impossible to touch the sacrum. A case of the kind has been published by Dr. S. H. Jackson; but it occurred in a woman who had not reached full term. In the first of my cases, the woman was at term, and the labor continued for several days; but the uterus regained its ordinary position after severe efforts, and the labor terminated spontaneously: the child was still-born, but the mother recovered. The other was published a long time ago, in a dissertation on retroversion of the womb, which has been sharply criticised by Dr. Dewees. The following is an abstract: "Mrs. F—— was taken with symptoms of labor, on Monday, June 16, 1806, at which time a discharge of the liquor amnii was perceived, and severe and apparently strong pains recurred at distant intervals. In the course of the day, the patient was examined per vaginam, when there appeared to be a singular condition of the part. The whole of the back part of the pelvis was filled up by a globular tumor, which prevented the finger from passing in the direction of the coccyx and sacrum, but it was obliged, in tracing the tumor, to take a direction towards the ossa pubis, above the crest of which it could be passed; but neither here nor anywhere else could the os uteri be felt.

"By introducing the finger into the rectum, it appeared that the tumor was uterine, and that some bulky part of the fœtus was contained within it; but whether the nates or the head, could not be clearly distinguished.

"On Tuesday, the 17th, the discharge of liquor amnii continued; the pains were frequent and excruciating, and the tumor was pressed down closer upon the perineum. A rigor, terminating in convulsions, and followed by fever and delirium, took place this day; but a prompt bleeding and evacuating the bowels relieved these symptoms.

"Wednesday, 18th, and Thursday, 19th, no material alteration was observed. The pains continued regular and distinctly marked through these days, but were much less severe and distressing than at first.

"Friday, 20th, another very careful examination of the parts was made. The uterine tumor presented the same shape and bulk, quite obstructing the passage towards the sacrum, for even the coccyx could not be felt, except the finger was introduced into the rectum; when the finger in the vagina was carried forward, in the only direction in which it could pass, namely, anteriorly, it reached above the pubes, but still the os uteri could not be felt; yet, on withdrawing the finger from above the symphysis pubis, there was now, for the first time, perceived upon it the true appearance of a show, which furnished a convincing proof that the os uteri was situated in that direction, and encouraged us to hope that an alteration in the state of the uterus was at hand.

"Our hopes were not vain; for, on the next day—Saturday, 21st—a con-

siderable alteration was discovered in the pains, and in the situation of the globular tumor, which occupied the pelvis. The pains were more powerful and effective, and the tumor, which had been contiguous to and pressing upon the perineum, was found to have a little receded, while a flattened mass (which proved to be the head of the child in a state of complete putrefaction, with the bones separated, and the brain almost dissolved) was forced down from above the pelvis, between the ossa pubis and the uterine tumor.

"After a few hours of active pains, the tumor ascended above the brim of the pelvis, and was no longer to be felt; but now the os uteri was easily distinguishable, though still very high.

"It was judged right to make an opening into the head, and about a pint of grumous blood and brains was evacuated; this allowed an opportunity of grasping the scalp, and by means of this so much assistance was afforded in extracting the child, that the labor was terminated in a few more pains.

"The patient perfectly recovered, and lived many years afterwards in good health, but never had another child." (*Synopsis.*)

"In a woman," says M. Velpeau, "who came to be confined at my amphitheatre, in the month of May, 1828, the fundus of the uterus was rather inclined backwards than forwards. The head of the fœtus formed above the strait a considerable projection, which descended in front of the symphysis pubis nearly to the vulva. Besides, the walls of the abdomen were so thin that the head, fontanelles, and sutures could readily be detected through them: the occiput was to the right, and the face to the left. The right parietal bone rested against the anterior face of the symphysis pubis, and the left remained in front. The os uteri, which was on a level with the superior strait, seemed to be scooped out of the substance of the posterior wall of the womb, which made it much longer behind than before. In order to reach the orifice, and penetrate towards the head of the child, I was obliged to bend my finger, so as to make it pass almost horizontally above the pubis. After seven days of pain and pretty strong contractions, the os uteri, although very soft and very dilatable, was scarcely opened at all. M. Desormeaux agreed with me, that by means of position, and the assistance of the hand properly combined, I ought to try to carry the head to the centre of the superior strait, by making it slide from below upwards, and from before backwards over the pubis. I began to execute this manœuvre at half-past eight o'clock, and continued it, alternating with several of the students, until nine o'clock. From this time there was no longer a tumor in front of the symphysis, and the labor progressed so rapidly that in less than an hour the child was born, and the placenta itself expelled." (*Meigs's Translation*, p. 404.)

Dr. Billi, Professor at Milan, reports a case (*Ann. de Chir.*, 1845, p. 113) in which the retroversion was so complete, that the orifice was situated five fingers' breadth above the pubis, whilst the posterior part of the excavation was occupied by the head of the fœtus. The fundus of the uterus, in the shape of a hard and rounded tumor, was situated between the vagina and the rectum, which it compressed violently.

I might also add similar examples from Dugès; but these two are probably quite sufficient to render what is meant by the posterior obliquity of the womb fully understood.

By summing up the symptoms so well described by Merriman, we shall have: 1, a very considerable elevation of the os uteri, which is carried high upward and forward above the symphysis pubis; 2, a tardy dilatation of the cervix; 3, the tumor, constituted by some part of the fœtus (the shoulder probably) pressing before it the posterior inferior portion of the womb that envelops it, is strongly engaged in the excavation, and occupies all the cavity of the lesser pelvis;[1] and, 4, the head situated above the symphysis pubis. By collecting in the same way the principal characters of M. Velpeau's case, we shall find a remarkable elevation of the presenting part; a very unusual elevation of the cervix uteri, the orifice of which, being turned directly forward, is placed above the symphysis, and is scarcely accessible to the finger; and, lastly, a considerable tumor formed by the child's head, just in front of the anterior face of the symphysis. And we may add, that such a tumor had previously been described by Dugès, in several of his observations.[2]

The posterior obliquity of the womb is rarely so disastrous in its consequences as Merriman's case proved to be; for most generally the strong contractions of the organ, the energetic efforts of the patient herself, and a sufficient amplitude of the pelvis, succeed in overcoming its unfavorable influence, without extraneous aid; and, besides, it often happens that, at the time the membranes are ruptured, the head descends into the excavation along with the discharged waters. But on the other hand, as in the instance of the author just quoted, the deviation of the fœtus, and of its presenting part, goes on increasing, and then it may require version.

[We have stated that all difficulty in accounting for the way in which posterior obliquity takes place is removed by regarding it as a result of irregular development of the uterus, the excessive dilatation of whose posterior segment pushes the cervix forward. That Prof. Depaul accepts this view is shown by the following case. A lady from the country, who had already borne children, was at the period of her confinement; pains had been experienced for several days, but the labor had made no progress. When M. Depaul was called he found no appreciable inclination of the uterus. On making an examination, the finger encountered quite a large tumor occupying a part of the cavity of the pelvis, more especially the posterior portion. The neck was thrust forward and lodged behind the symphysis pubis. It had the form of a transverse fissure, with two projecting lips, and its cavity was not blended with that of the body of the uterus. On passing the finger

[1] It is highly probable that the engagement of the shoulder in the excavation is owing to the putrefaction of the fœtus. Merriman has not noted the prominence formed above the symphysis pubis by the head; the absence of this projection, which was so remarkable in M. Velpeau's case, was certainly due to an engagement of the shoulder, and the head was probably thrown back on the opposite one, so that a spontaneous cephalic version took place.

[2] It has been remarked, in many cases, that the child's head presented, after birth, a red longitudinal mark between one of the parietal protuberances and the sagittal suture. This long, narrow track seems to be owing to the contusion made on the scalp by the upper border of the pubis. In a case of this kind, reported by Paisley, the midwife could not detect the child's head until after the discharge of the waters. The head would not descend, and the woman died of exhaustion; and, at the autopsy, the frontal and parietal bones of the right side were found applied against the pubis, which had made a depression there of one or two inches in extent.

between these lips, it was found that the internal surface of the anterior one presented a concavity looking backward. The posterior one was swollen at its upper extremity, and had, on a level with the internal orifice, a transverse, rounded projection, a little convex in front. The swelling seemed to be about the size of a finger, extremely hard and tense, like a contracted tendon. M. Depaul succeeded in hooking his finger around this part, and thus became satisfied that it was formed by the posterior half of the internal orifice, whose fibres had become hypertrophied and contracted. He also found that the uterine cavity, in consequence of an abnormal development posteriorly, formed a sort of bag, which hung far below the neck, and in which a part of the breech was engaged. Incisions of only three or four sixteenths of an inch in depth were made to the right and left on the internal orifice, when the neck immediately opened, allowing the operator's hand to pass readily into the uterus and seize the pelvic extremity. A very large fœtus, in process of decomposition, was easily extracted, and the patient recovered rapidly.

What was the difficulty in this singular case? Both MM. Devilliers and Depaul regard it as an extreme development of the posterior portion of the inferior segment of the uterus, in connection with another peculiarity not always met with, viz., hypertrophy and tension of a portion of the circular fibres situated at the internal orifice. (*Bulletin de l'Académie de Médecine*, 1865.)]

3. *Lateral Obliquities.*—For the reasons formerly given (page 702), the right lateral obliquity is far more frequent than the left; indeed, but very few examples of the latter are ever met with. These variations in the direction of the uterus are rarely of such a nature as to constitute a serious obstacle to parturition; they act more particularly in modifying, and sometimes even in altogether changing, the presenting part of the fœtus. Let us suppose, for instance, says Dugès, that the womb be oblique enough to carry the child's head towards the border of one of the iliac fossæ, as I have seen in two cases; but it can hardly remain at this point, for it will either be pressed back into the excavation, or else it will slip further forward and outward, and the child, by thus becoming more and more oblique, will ultimately present one or the other shoulder at the superior strait.

4. *Treatment of Uterine Obliquity.*—In a large majority of cases the obliquity of the womb, whatever may be its variety, presents no special indications for treatment; it constitutes a source of delay in the progress of the parturition, but it scarcely ever becomes a serious cause of dystocia. Consequently in these, as in all other slow labors, the first duty of the practitioner is to *wait*. In some very rare instances, where it happens that an excessive degree of obliquity is not rectified under the influence of the powers of nature, the intervention of art becomes necessary; and the indications then presented are,—to restore the womb to its normal position, to sustain it there, and to remedy any accidents that may happen.

The measures whereby the first two indications may be fulfilled, are perfect rest on the back, when the obliquity is anterior, or on the side opposite to the one occupied by the fundus uteri, when it is lateral, and the employment of the hands to support and maintain the deviated organ, or of a large bandage properly applied, to produce the same effect. The patient should be advised not to bear down until after the displacement is remedied. If these means are not sufficient, it will be necessary, while thus operating externally on the body, to act at the same time on the neck; for that purpose intro

ducing two fingers into the uterine orifice, and taking advantage of an interval between the pains to draw it gently towards the centre of the pelvis, whilst the other hand is employed in pressing the fundus of the organ in the opposite direction.

These measures generally succeed, and their use should be continued as long as the double interest of the mother and child will permit; but if they prove unsuccessful, and the reduction of the obliquity and the delivery becomes impossible, our only resource is to open an artificial passage, by making an incision into that portion of the uterine wall which projects into the vagina (the vaginal Cæsarean operation). Still this ought to be considered an ultimate resource, and one not to be resorted to until after the impossibility of introducing the hand into the uterus to effect the pelvic version has been fully ascertained.

In the posterior obliquity, the woman ought to remain seated or standing, or, if possible, even reclining a little forward. If the head forms a projection above and in front of the pubis, as in the case of Velpeau, and those reported by Dugès, the hand should support the hypogastrium, and, by perseverance, it will succeed in pressing back the head to the centre of the excavation. This manœuvre will be rendered more easy by the vertical position, by walking, or, if necessary, by the woman's resting on her hands and knees, so that the fundus of the womb will hang forward, as it were. A kind of see-saw movement then takes place, which, by depressing the part of the child that occupies the fundus, elevates that near the neck. Finally, should all these plans fail, the pelvic version must be resorted to.

§ 2. Of Hernia of the Womb.

Most of the cases of hernia of the womb may be referred to what we have described under the name of anterior obliquities of this organ. These are true *eventrations*;[1] and it is exceedingly rare for the uterus, by escaping through one of the natural openings of the abdomen, such as the inguinal or the crural rings, to constitute a hernia, properly so called. Some well-established examples of it, however, are found in the books; for instance, Simon, in his Memoir on the Cæsarean operation, and Sabatier, in his work on the displacements of the womb and vagina, both of which are found in the valuable collection of the Academie de Chirurgie, have related several very curious instances of the kind.

In most cases, the displacement of the womb had existed prior to the fecundation, and the organ thus situated without the abdominal inclosure, continued to be developed until full term. In some others, which are more difficult to admit, this organ having attained a certain degree of development, gradually dilated one of the crural or inguinal rings, and constituted an external hernia. These latter have been admitted by Desormeaux, but they are rejected by M. Moreau, who considers them as genuine eventrations, and we are disposed to adopt the latter view, at least so far as regards the case reported by Ruysch. Sometimes, however, the existence of an old

[1] A term applied to the hernias following any accidental opening in the abdominal walls; as also the falling of the belly, resulting from an extreme relaxation of the anterior ventral walls.—*Translator.*

hernia has occasionally seemed to favor the development of a hernia of the uterus.[1]

The characters of this latter, during the gestation and labor, are too well marked to require a detailed account of the signs of recognition. But, at the time of the parturition, the inefficiency of the efforts of nature should be fully tested by a prolonged delay, before resorting to the Cæsarean operation, which is the only resource recommended by very many accoucheurs; for, in some cases, the labor has been known to terminate spontaneously. In a case related by Ruysch, a midwife, by raising the tumor, succeeded in returning the fœtus into the abdomen, and the delivery was effected as usual.

§ 3. Of Prolapsus Uteri.

It is possible for a prolapsus of the womb to exist in a non-pregnant woman, and yet the latter may conceive, as is fully proved by the following observation of Marrigues, reported by Chopart. "A female, who was affected with a prolapsus, had been impregnated by the direct and immediate introduction of the fecundating principle into the uterus, through its gradually dilated orifice." The conception having once taken place, the uterus may go on developing until term, and at the time of labor may present an enormous tumor hanging between the thighs; or this falling may only occur during the gestation; and again it may suddenly come on in the course of the parturition, where the patient is abandoned to herself, or is attended by inexperienced persons, who allow her to remain standing or walking for a long time, or who permit her to make strong bearing-down efforts, with a view of hastening her delivery before the os uteri is sufficiently dilated.[2]

[1] One Ramus, aged twenty-four years, and having borne six children, had a right inguinal enterocele, which appeared some time before her marriage. At the third month of a seventh pregnancy she was attacked by an annoying, dragging sensation on the left side of the hypogastrium. The tumor hitherto observed in the latter region disappeared, and she discharged blood by the vagina. By placing her hand over the inguinal hernia, she discovered there a hard and strange body, that was painful on pressure, and which she several times attempted to push back again, without success. Several weeks afterwards she felt some movements at that point, and sent for a physician, who detected at the lower and right portion of the abdomen a tumor, that descended on the thigh of this side, covering the pubis, and even extending across as far as the left thigh; this tumor was twenty-six inches in circumference at the middle, and twenty-four inches at its junction with the abdomen. Several attempts at reduction were made without effect. The pains came on at the eighth month, and hysterotomy was then performed, but the reduction was still impossible after the delivery, and the uterus was left on the exterior. Both the mother and child were saved. (*Ledisma de Salamanca; Gaz. de Méd.*, 715, 1840.)

[2] According to M. Moreau, the patients are particularly exposed to this kind of displacement in the five or six weeks following the delivery. The uterus, which had been distended by the product of conception, still infiltrated by fluids, hypertrophied in a measure, has a much larger size and a far more considerable weight than usual, the ligaments that were stretched have regained as yet neither their consistence nor habitual strength. Now if, on the one hand, there is more weight in the organ to be sustained, and, on the other, greater weakness of the ligaments which should sustain it, it is very apparent that a cause which, in the ordinary conditions of life, would be insufficient to bring about a displacement, will produce it under the circumstances

The prolapsus may prove a source of serious difficulty in the progress of the parturition, for experience has shown that this accident may not only be productive of long delays, but likewise of real danger; perhaps, it may even render the spontaneous expulsion of the fœtus altogether impossible, either (as has long since been remarked) because the womb, which has descended to the lowest part of the abdomen, and possibly even beyond the abdominal inclosure, is removed, as it were, from the influence of the contractions of the abdominal muscles; or because, being wedged in between the surface of the child's body and the walls of the pelvis, it has lost a great part of its energy in consequence of the long-continued pressure.

The difficulties to be overcome will also vary according to whether the prolapsus be recent or of long standing; for, in the latter case, the prolonged contact of the organ with the internal face of the thighs, and with the dress, may have produced a state of induration of the cervix which opposes its steady dilatation; indeed this has often been impossible, and the physician has been obliged to incise it to overcome the resistance offered by the indurated parts. On the contrary, where the accident has recently occurred, or, still better, if it is only manifested during the labor, the dilatation of the os uteri is sometimes effected spontaneously; and the duty of the accoucheur is then limited to facilitating it by the use of the appropriate means.

The special indications presented by a falling of the womb, when it occurs during pregnancy, have already been treated of. (Page 528.)

All attempts at reduction would be dangerous during the labor; and, consequently, the accoucheur must then be satisfied with hastening the dilatation of the os uteri as much as possible, and with preventing the lacerations it would suffer, by suitable incisions, in cases of induration.

The delivery of the placenta likewise demands much circumspection, since it is evident that we cannot trust its expulsion to nature, and still less can we draw on the cord in the usual manner; hence, the after-birth must be artificially separated. Immediately after its delivery the uterus retracts, and then its reduction is often quite easy.

[§ 4. Tumors of the Body of the Uterus.

Puchelt mentions ten cases of cancerous degeneration of the body of the uterus, the neck being healthy. In one case, the entire body of the organ was diseased. As these tumors rarely present any mechanical obstruction to the expulsion of the child, we will merely observe that they interfere with the contractions of the uterus and predispose to its rupture.

Fibrous tumors are by far the most common. They are distinguished according to their situation as sub-mucous, interstitial, and sub-peritoneal. All these may interfere with delivery by disturbing the regularity of the contractions of the uterus, but chiefly by obstructing mechanically the expulsion of the fœtus.

The fibrous masses, whether pediculated or not, which grow upon the segment of the uterus, may be assimilated to the same kind of tumors and polypi of the neck. We have, therefore, nothing to add to what has been already said in regard to them. (See *Fibrous Tumors of the Neck*, page 706.)

Fibrous tumors of the upper segment are grave in proportion to the length of

just indicated. For these reasons, therefore, we cannot too strongly urge the patients to keep in the horizontal position during the early part of their lying-in, and to avoid all kinds of violent exertions for the first six weeks following their delivery.

their pedicles. When non-pediculated and situated in the fundus, they have no tendency to engage in the cavity of the pelvis below the head of the fœtus; whilst those with long pedicles attached at the fundus, may form serious obstacles should their lower extremity become engaged below the head. In the latter case, the only thing to be done is to divide the pedicle and remove the tumor.

All sub-mucous fibrous tumors are liable to cause hemorrhage during the delivery of the after-birth, because their size interferes with the contraction of the uterus. An unusually severe hemorrhage may also result from a direct insertion of the placenta upon the portion of mucous membrane covering the tumor. It will be readily seen how this unfortunate disposition of the parts might facilitate the loss of blood from the open orifices of the utero-placental vessels, which remain unclosed because the tumor obstructs the contraction of the muscular fibres.

The peculiar changes which occur at the internal surface of the uterus after delivery, often have a singular effect upon the continuance of sub-mucous fibrous tumors. There are cases which prove that the uterine mucous membrane may undergo ulceration, and the tumor thus exposed become enucleated, so to speak, and expelled into the vagina. I have myself seen two cases of this sort of spontaneous cure.

Sub-peritoneal fibrous tumors are generally less grave than the sub-mucous variety, yet they may prove a very serious obstacle should they happen to occupy a part of the cavity of the pelvis. I reported in my thesis for the *Concours*[1] a case furnished me by M. H. Blot, and of which the following is a summary. A woman

FIG. 110.

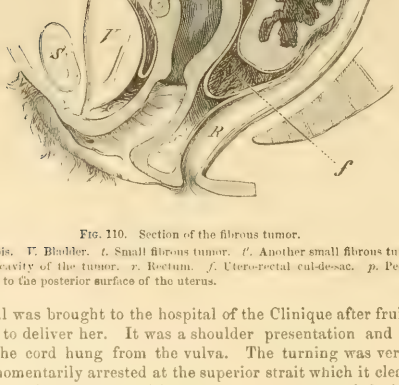


FIG. 110. Section of the fibrous tumor.

S. Symphysis pubis. *V.* Bladder. *t.* Small fibrous tumor. *t'.* Another small fibrous tumor. *T.* Principal tumor. *c.* Central cavity of the tumor. *r.* Rectum. *f.* Utero-rectal cul-de-sac. *p.* Pedicle of the tumor where it is attached to the posterior surface of the uterus.

from Argenteuil was brought to the hospital of the Clinique after fruitless attempts had been made to deliver her. It was a shoulder presentation and the left hand and a loop of the cord hung from the vulva. The turning was very difficult and the head was momentarily arrested at the superior strait which it cleared suddenly. The patient died of metro-peritonitis, and the autopsy revealed the presence of three fibrous tumors. One of them was attached to the middle of the posterior

[1] Tarnier, *Cases in which it is necessary to extract the Fœtus.* Paris, 1860.

surface of the uterus by a pedicle of over two inches in length, which soon enlarged to a volume greater than that of the head of a fœtus at term. It filled the utero-rectal cul-de-sac, projected above the superior strait, and reached the fundus of the uterus. At numerous points it was adherent to the recto-uterine cul-de-sac. An antero-posterior section having been made, it was found that the centre of the tumor was broken down into a pulpy mass of a grayish color. (See Fig. 110.)]

CHAPTER IX.

OF TUMORS APPERTAINING TO THE ADJACENT PARTS AND CELLULAR TISSUE OF THE CAVITY OF THE PELVIS.

These tumors are various in character, and may appertain either to the ovary, Fallopian tube, bladder, intestine, or cellular tissue of the pelvis.

§ 1. Tumors of the Ovary.

This organ may be affected with a number of diseases, nearly all of which have the effect of singularly augmenting its volume; thus cysts, distended with solid or liquid matters, are frequently observed there, and abscesses have also been met with; or this body itself may become hypertrophied, or be affected with scirrhous or encephaloid cancer. But we shall not treat of these latter affections, further than to examine the influence they may have over the puerperal functions. In this respect, it is highly important to ascertain the exact seat of the tumor; for sometimes the diseased ovary remains in the abdominal cavity above the superior strait; and, again, it is very often displaced, and falls into the pelvic excavation. In the former case it may, doubtless, obstruct the development of the uterus by its bulk, and thus bring on a premature labor; or it may produce an obliquity of the womb by pressing the latter to the opposite side, and thus prove a source of dystocia; but it particularly claims the attention of the accoucheur when situated in the lesser pelvis; for it may then so obstruct the passages, that a natural delivery of the child becomes wholly impossible.

The tumors, constituted by the displaced ovary, nearly always fall down into the cul-de-sac, formed by the peritoneum, it being reflected from the posterior surface of the uterus to the anterior one of the rectum. In a single case only, reported by Jackson, has it been found behind the rectum, which latter was then pressed forward. This singular anomaly merits attention.

The ovarian tumors vary greatly, both in their volume and form — from the size of a small orange up to that of a child's head; sometimes they only occupy a part of the excavation, while at others, they fill it up so completely that the finger can scarcely be introduced between them and the pelvic walls. It is important in practice to ascertain these differences of size and location, and equally so to detect the nature of the tumor, and the kind of material that forms it. In some cases of ovarian dropsy, the fluctuation is so evident that no possible doubt can exist concerning its character, but in others, this sensation is not so clearly recognized; though here the smooth and polished surface of the tumor, and its rounded form, compared with the

irregularities, and the nodules exhibited by cancerous degenerations of this organ, will facilitate the diagnosis. The density of the fluid tumor, its elastic resistance and fluctuation, are singularly modified during the contraction; because, being then strongly compressed by the child's head, the sac, that was at first soft and yielding, becomes hard, tense, and resistant; consequently, it is advisable to examine both during and after the pain, for the differences then presented will likewise aid in making out the diagnosis. The exploration should be made both by the vagina and rectum, since this is the best method of distinguishing the enlargements of the ovary from those belonging to the uterus or the vagina.

The presence of such tumors is always a very unfavorable complication of the labor; but the prognosis will necessarily vary with their volume, seat, nature, and mobility, as also according to the period at which the physician is summoned. Thus, in thirty-one cases recorded by Puchelt, fifteen were fatal to the mother and twenty-three to the child. Twenty-one children and one woman died during the labor.

As regards the treatment, the same course is not always to be pursued in the cases under consideration. There is evidently nothing to be done where the size and locality of the tumor afford a well-grounded hope of a spontaneous delivery; but when it is movable, and the head has not yet engaged, it is recommended to attempt to press up the former above the abdominal strait; and, should the tumor still have a tendency to fall back, after having been carried up, it ought to be supported, while the feet are sought after, or an application of the forceps is resorted to.

But in some grave cases, the engagement of the head, or the adhesions of the tumor, render a return of the latter impossible; here it is particularly important to be certain of its nature; and if the signs above indicated have not proved sufficient to settle the diagnosis, a puncture should be made in it, which would determine the question of its fluidity or solidity. According to Drysdale, microscopical examination of an ovarian fluid will almost invariably show the presence of a granular cell, differing in appearance from all other accompanying cells and in its behavior with acetic acid. If it proves to be an ovarian dropsy, it is to be evacuated by a trocar somewhat larger than the one used for the exploratory puncture; but if the cyst be multilocular, or if it contain a cheesy matter that cannot escape through the canula of the trocar, a free incision will evidently be requisite.

By allowing the fluid to escape, the incision would have the double advantage of facilitating the labor when the tumor is very large, and of preventing consecutive inflammation of the cyst, when the latter, though too small absolutely to prevent the expulsion of the fœtus, is yet large enough to delay it greatly. Under the latter circumstances, indeed, the compression it undergoes during labor may excite in it a violent inflammation, and, in some cases, even produce a rupture. As a consequence of this rupture, the fluid may be discharged externally through a perforation of the vagina, or be effused into the cavity of the peritoneum.

The incision or the puncture is usually made by the vagina, as the evacuation of its contents is more easily effected through this canal. Some persons, however, fearing lest an incision made through the vaginal wall might

become enlarged at the moment of the passage of the head, have recommended the introduction of the instrument through the rectum; and although this mode of operating ought, in general, to be rejected, it should certainly be followed in those cases in which the tumor is located between the posterior part of the rectum and the anterior surface of the sacrum.

Again, the tumor is solid, it cannot be pushed up, and the size is so great as to render an extraction of the fœtus altogether impossible. The case is then most serious, and we have only to choose between an extirpation of the tumor, or a resort to embryotomy, or to the Cæsarean operation. Under such circumstances, if it were possible to ascertain that the abnormal growth had not contracted intimate adhesions to the neighboring parts, I would willingly adopt the views of Merriman, who recommends its extirpation but if this latter be deemed impracticable, a mutilation of the child might be resorted to, when there is room enough between the tumor and the pelvic wall to afford a passage to the fœtus grasped by the embryotomy forceps; otherwise, the Cæsarean operation seems to be the only resource.

The following summary, which will serve to illustrate the danger of the operations just recommended, is extracted from M. Puchelt's statistics: In five cases, where the delivery was abandoned to the resources of the organism, four of the mothers died, and but two children were born living. The simple pushing up of the tumor was only followed by the safety of both individuals in a single instance, while in another case the infant was still-born. Version was performed twice, after having previously pushed up the tumor, but this double operation was only once successful for the woman; the child, though born living, died immediately afterwards; but in the other, both mother and child perished. A simple puncture of the tumor was attended with success in one case, though in two others it did not obviate the necessity for embryotomy, and both women died. The incision of the mass, which was practised in three instances, was favorable to both individuals in a single case only, while in the other two the children perished; in the fourth, version was effected after the incision, but both mother and child were lost; the same result attended the application of the forceps in one case; a perforation of the cranium was found necessary in six, and only three of the women recovered; and, finally, both parties survived in those instances where the blunt hook could be employed.

§ 2. Tumors appertaining to the Fallopian Tube.

As the tumors of the tube are much more rare than those of the ovary, they seldom constitute a mechanical obstacle to the delivery. In fact, only one case of the kind is on record, that related by Chambry of Boulaye, in the old *Journal de Médecine, Chirurgie, et Pharmacie*. It appeared as a round, hard, irregular, and partly osseous tumor, the true seat of which was subsequently ascertained by the *post-mortem* examination. If a similar case should be met with, it would offer the same indications for treatment as the ovarian tumors.

§ 3. Tumors of the Rectum.

A. Fecal matters may accumulate and harden in the rectum, and give rise to unpleasant symptoms, which sometimes simulate a regular disease

of the intestine; and if such an accumulation takes place towards the end of pregnancy, it may render delivery difficult, or even impossible, by obstructing the passages the fœtus has to traverse. In several of the reported cases, injections could not be made, and laxatives given by the mouth proved ineffectual. For instance, Guillemot says, "We are constrained, before delivering her, to extract all the excrements which distended the said large bowel;" and Lauverjat likewise remarks, "I introduced my finger into the vagina, and pressed on the matters, with the view of diminishing their solidity; I then gave two injections, which soon emptied the intestine; the pains, which had been completely suspended for six hours, reappeared, and the labor was terminated in less than fifteen minutes." Under like circumstances, I know of nothing better than to follow the example of these practitioners.

A curious case, in many respects, is reported by Fournier, who says: "I was sent for by three surgical students, who had been ineffectually attempting to deliver a woman for five days. Having ascertained, on my arrival, that she was costive, and had not had a passage for a week, I immediately directed an injection. The student charged with this duty endeavored in vain to find the anus; and, on going to his aid, I discovered that it was imperforate, and that no vestige whatever of an orifice remained; but, instead, a line similar to the raphe extended from the coccyx to the vulva. I introduced my finger into the vagina, where I found the rectum floating, and as it was filled with excrement, compressing the womb, the canula was introduced there, and the injection penetrated into the intestine, from whence a prodigious quantity of cherry-stones, mixed up with fecal matters, came away at once; and after this evacuation, I terminated the labor." (*Dict. Sci. Méd.*, tom. iv. p. 155. *Cas. rares.*)

B. *Scirrhus.*—Dr. Lever relates having met with a case where the labor was rendered difficult by the presence of a cancerous tumor situated three inches above the anus. But such tumors rarely acquire a large size, and the application of the forceps would nearly always prove sufficient to overcome the obstacle.

§ 4. Tumors of the Bladder.

The tumors in the pelvic cavity, dependent on the bladder, may be caused either by a procidentia vesicæ, a cancer of this organ, or a urinary calculus. In addition to which, we have elsewhere spoken of the unfavorable influence that an excessive distention of the bladder might have over the puerperal functions.

A. *Procidentia Vesicæ* (Falling of the Bladder).—Under this title, certain authors have described an inconsiderable displacement of the bladder, but which does not the less constitute a true hernia of the organ; and we shall, therefore, refer our remarks on this subject to the article in which hernial tumors are treated of in detail.

B. *Cancer of the Bladder.*—Puchelt extracts one case of this disease from Oberteufer, and Dr. Lever reports another; both of which would seem to prove that the vesical walls, when attacked by cancer, may form a tumor in the excavation large enough to obstruct the course of parturition. As to

its treatment, this tumor evidently presents the same indications as all the other solid ones before described.

c. *Urinary Calculi.*—Instances of a stone in the bladder descending into the excavation, and thereby obstructing the free passage of the head, are not very unusual. The numerous cases of this kind on record prove that they are always situated below the head, or else are placed between it and the symphysis pubis. In a single instance only, reported by Lauverjat, the calculus was above the pelvis, though, as M. Velpeau remarks, it is difficult to understand how it could then arrest the expulsion of the fœtus.

Calculi vary very much in their size, and the same is true of their shape, which fact modifies the prognosis. The diagnosis is not always an easy matter, though if the tumor felt behind the symphysis pubis is hard, circumscribed, and gives rise to pain when pressed upon by the finger or the child's head, if it is situated without the vagina, and if it is firmly fixed during the contraction, but is movable during the relaxation of the womb there is every reason to suspect the existence of a calculus; which suspicions would naturally lead us to the use of the catheter, whereby the foreign body can nearly always be detected.

Treatment.—An attempt should be made to press up the stone above the superior strait, before or even during the labor, and prior to the engagement of the head; or, if the latter is still movable—although it may be engaged—it should be raised up from the strait, and the calculus be pushed above it. But, unfortunately, it is not always possible to do this, either because the head has descended too far to be pressed back (the stone being below it), or because this latter is forcibly wedged in between it and the symphysis. In such cases, an extraction of the calculus seems to be the only resource; however, this need not be attempted at once, for some of the reported facts would seem to prove that its spontaneous expulsion may take place, even where its great size might preclude all hope of such an event, as occurred in the following case reported by Smellie. The wife of a coal-porter, who had long been suffering from the presence of a stone in the bladder, became pregnant. The midwife, summoned at the time of labor, was surprised to find a hard resistant body lying before the head; but as the means of the patient did not admit of her sending for a physician in consultation, the midwife could only keep up the spirits of her patient during the long and painful parturition. At last, she felt something coming away, which proved to be a stone about the size and shape of a goose's gizzard, and which weighed from five to six ounces. Immediately after its escape, the child was expelled, and the woman recovered in due time, but she afterwards suffered from incontinence of urine. Some surgeons have been encouraged, probably by facts of this kind, to attempt an extraction of the calculus through the previously dilated urethra; but this operation requires too much time to admit of being performed during the progress of parturition. If there should be no hope of succeeding by the forceps or pelvic version, on account of its large size, it would be necessary to resort to the operation of vaginal lithotomy, and incise the urethra directly on the stone through the anterior vaginal wall.

§ 5. Of Hernial Tumors.

A considerable portion of the intestine, omentum, or bladder, may become engaged in one of the culs-de-sac formed by the peritoneum, in being reflected from the bladder to the womb, and from the latter to the rectum, and thus constitute a true *vaginal* hernia. But when the parts that are displaced and engaged between the rectum and the vagina descend still more, and cause a prominence in the perineum, the term *perineal* hernia is applied.

Under the title of *vagino-labial* hernia, a tumor has been described which is situated in the substance of the labia, or in the lowest and most projecting part of the fold which it forms with the skin.

A. *Intestinal or Omental Hernia.*—The seat of a vaginal enterocele, or epiplocele, is sometimes between the vagina and bladder, but oftener between the rectum and posterior wall of the vulvo-uterine canal, and always on one side of it, in consequence of the vaginal adhesions both behind and in front. The misplaced organ forms a tumor there which is very variable in its size, and which either presents the clammy softness of epiplocele, or the elasticity or rumbling of an enterocele. Though easily recognized, these tumors have, in some instances, given rise to serious mistakes, which might have proved disastrous to the patient. I was summoned, says Levret, to a case of this kind, where the question was actually discussed, whether a large portion of the tumor should be removed or not; but I demonstrated, in a satisfactory manner, that some part of the intestine had slipped down into the substance of the septum, through the bottom of the cul-de-sac that is found between the neck of the womb and the upper part of the rectum. (Levret, *Abus des règles.*)

The prognosis is unfavorable, not only from the obstacle thereby created to the expulsion of the child, but also from the pressure of the head on the hernial sac; because an inflammation, that is always serious, and which might sometimes even terminate in gangrene, may result in consequence. All authors have, therefore, recommended the reduction of the hernia as soon as possible.

To accomplish this, it is better to place the woman on her knees and elbows, so as to facilitate the return of the intestine and the engagement of the head; this position was followed by the happiest results in the case above reported. In another instance, Stubbs, by compressing the hernial tumor, succeeded in reducing it, and the head then engaged. In my estimation, the taxis should be preferred to Levret's method, taking care to sustain the head at the same time with the other hand, if the hernia be voluminous. Where the reduction is impossible, it is necessary to terminate the labor as soon as possible by the aid of the forceps, or by turning.

B. *Vulvar or Perineal Hernia.*—We may be allowed to speak in this place of vulvar or perineal hernias, which, although they do not present a mechanical obstacle to parturition, may give rise to special indications during pregnancy and labor. These tumors, which are situated in the lowest and most posterior part of the greater labia, may be formed by the escape of a loop of intestine, and sometimes a portion of the bladder. They have been oftener observed during pregnancy than at any other period, and may ultimately acquire a very considerable size. Papus men-

tions having dissected one which had the form of a large bottle, hanging to the right of the anus, and descending as far as the leg. In one of the cases observed by Smellie, the tumor, which toward the end of gestation was as large as the fist, became strangulated and gangrenous.

The seat of the tumor, which is always situated in the lower part of the greater labia, between the edge of the anus and the tuberosity of the ischium, the ease with which it is reduced in the horizontal position, and its sudden reappearance when the patient rises or makes the least exertion, serve to indicate its nature. Enterocele may be distinguished from cystocele by the gurgling which accompanies the reduction of the former. The latter often diminishes in size after urinating or using the catheter, and desires to urinate are produced by pressing upon the tumor.

It is evident that the exertions of labor have a tendency to increase the size of the hernia greatly, and even to produce strangulation. It should be kept reduced by pressure properly applied.

c. *Vesical Hernia, or Cystocele.*—It sometimes happens during labor that the fundus of the bladder descends below the head, and constitutes a tumor of variable size at the anterior superior part of the vagina; the descent being probably caused by the pressure made by the child's head or the inferior part of the womb, on the fundus of this organ. The patient has a feeling of weight or fulness in the pelvis, and a dragging sensation about the umbilicus; she has a constant desire to urinate, without the power of emptying her bladder, though, sometimes, each uterine contraction is followed by the emission of a small quantity of urine; besides which, a more or less oval tumor, that is smooth, soft, and fluctuating between the pains, but hard and tense while they last, is detected by the touch at the upper front part of the vagina; and above this the head can often be distinguished; indeed, the finger may easily slip behind the tumor, and reach the cervix uteri; but it cannot pass between the former and the pubic symphysis.

FIG. 111.

Vaginal cystocele, taken from Ramsbotham.

The tumor formed by a cystocele is occasionally quite large. Madame Lachapelle says: "The first thing that attracted our attention was a pedienlated tumor, about the size of an egg, which projected a little from the vulva, and seemed to be attached to the right anterior wall of the vagina near its middle. The pedicle was about an inch and a half in thickness, and the tumor contained a liquid, all of which could be pressed back through the pedicle; an opening with a thick margin was then detected, which appeared to communicate with the bladder. In fact, according to the woman's account, the tumor augmented in size in the erect position, though it often disappeared after the emission of urine, and always when using the cold bath. The uterine pains increased the size of the hernia, and the head in descending compressed, and rendered it very tense; after having emptied the bladder, I reduced it, and recommended the students

to support it with two fingers during each contraction of the womb. The head soon cleared the passage, sustaining the hernia itself, and the labor terminated favorably."

The tumor is nearly always seated at the anterior part of the vagina; but in a case reported by Sandiford, it was located between this canal and the rectum.

There is one variety of tumor, formed in the pelvic cavity, which is the more worthy of attention, as its true nature might be misunderstood from its singular situation. It depends on a lateral displacement of the bladder, and M. Christian assigns to it the following characters, namely, a remarkable fulness on one side of the pelvis, more especially during the uterine contractions, which give to the tumor an evident elasticity and tension; it is generally circumscribed, though its base is somewhat spread out, and extends along the side of the pelvis as far as the sacrum; its volume varies, of course, with the quantity of fluid contained in the sac, occasionally equalling one-third of the transverse diameter of the pelvis.

The tumefaction completely disappears after the use of the catheter; and, by directing the concavity of the instrument downwards, its point can be felt through the walls, and can readily be moved from before backwards in a horizontal direction. As the tumor is covered by the vagina, and its base is diffuse, there is no danger of mistaking it for the bag of waters, since it does not prevent the finger from reaching the uterine orifice. Cystocele may sometimes be removed by pressure, and almost always by the catheter; its size will vary with the extent of displacement, and with the quantity of urine contained in it.

Cases of this kind merit serious attention, for they may be confounded with other tumors; and such an error of diagnosis might lead to the performance of a useless and perhaps dangerous operation. Dr. Merriman (*Synopsis*, page 202) speaks of a surgeon, who, supposing he had to treat a case of hydrocephalic head, thrust a sharp instrument into the bladder: and a similar mistake, according to Hamilton, was committed by another practitioner, who imagined he was opening the bag of waters.

In all these obscure cases, a resort to the catheter is the best possible means of diagnosis; nevertheless, it must be observed, that, for this measure to be conclusive, it should be done in such a manner as to plunge the beak of the instrument into the liquid contained in the cavity of the tumor: that is, after the instrument has once entered, it should be turned over, so as to make its concavity look downwards and backwards. As a remedy, this is the only one requisite, and the instrument ought to be left in the bladder until after the head is engaged.

Unfortunately, its introduction is not always an easy matter, particularly where the head has been wedged in the pelvis for a long time; under such circumstances, an attempt should be made to press up the former during the intervals; but if this is impracticable, and there is reason to fear a rupture of the bladder from its overdistention, I know of no other resource than to puncture the organ with a very delicate trocar.

§ 6. Of Tumors developed in the Cellular Tissue of the Pelvis.

We have yet to treat of the fatty, the fibrous, and the cancerous masses, and of the abscesses, or encysted tumors, that may be developed in the cellular tissue of the lesser pelvis, nearly all of which are situated in the substance of the recto-vaginal septum, though they are occasionally found on the sides of the vagina. In one instance, reported by Ed. Meier, the delivery was rendered impossible by the existence of a cyst, about the size of a child's head, between the uterus and the bladder. The steatomatous and cancerous tumors are usually found in contact with the osseous or ligamentous walls of the pelvis, to which they seem to appertain. (See page 676.)

It must be apparent that there is an identity of nature and seat between the tumors of the cellular tissue and those of the ovary; the reducibility of the one, when non-adherent, and the irreducibility of the others, constitute the only marked difference between the two. Consequently, the diagnosis is not easily made out after the engagement of the head, or when the ovarian tumor is retained in place by old adhesions; but, fortunately, that would be an error of little importance, since both present the same indications for treatment. It is more easy to distinguish the tumors of the cellular tissue from those appertaining to the organs before spoken of, and we refer to the signs already given, as characteristic of each of them.

The reader will understand that the prognosis varies according to the size, nature, density, and seat of the tumors. When small, compressible, and situated in the direction of one of the long pelvic diameters, it will most frequently permit a spontaneous termination of the labor; and this may also take place, if, notwithstanding its hardness and size, it still retains a certain degree of mobility. Even in those cases where it is impossible to push it above the superior strait, we may still hope that, being forcibly compressed by the child's head, it will permit the latter to pass. During my sojourn at the Clinique, I saw a woman, in whom the child's head was arrested at the superior strait for a long time, by a tumor, which was probably fibrous in its character, and was situated in front of and on a level with the sacro-iliac symphysis. An application of the forceps had been seriously thought of, but the tumor, located in the recto-vaginal septum, was gradually forced down by the head, under the influence of strong contractions, as far as the floor of the pelvis, where it was pressed backward, at the same time distending the perineum, and the labor terminated by the birth of a living child.

In many cases, the volume and permanence of these tumors do not permit us to anticipate so happy a result, and it will then be necessary to interpose. The indications to be fulfilled will vary according to the particular case; that is, where an abscess or an encysted tumor is detected, it is to be punctured, so as to evacuate the liquid, or it is to be incised when the contents cannot be removed by a simple puncture; but where the tumor is solid, is easily accessible, and has contracted no intimate adhesions with the vagina or rectum, it ought to be extirpated. Two modes of operating have been recommended for this purpose; in the one, the vaginal wall only is incised, while in the other the tumor is reached by making an opening in the perineum. The success obtained by Drew and Burns pleads in favor of the

latter procedure. In the worst cases, where the situation of the tumor, or the numerous and firm adhesions which it has formed, render its extirpation impracticable, our only resources are in the obstetrical manipulations, properly so called; namely, the application of the forceps, or tractions on the feet, if the tumor is not very large, and the Cæsarean operation, or embryotomy, if the excavation be so obstructed that the extraction of a living child is impossible.

CHAPTER X.

RUPTURE OF THE UTERUS AND OF THE VAGINA.

ARTICLE I.

RUPTURE OF THE UTERUS.

Rupture of the womb is one of the most dangerous accidents that can happen to a female in the puerperal state. Exceedingly rare during the early months of gestation, it is somewhat more frequent in the latter half of pregnancy; but it is during the second stage of the labor, especially, that it most frequently takes place.

Rupture of the uterus has seldom been observed in women bearing their first child. Thus, in seventy-five cases, reported by Churchill, nine occurred in primiparæ, fourteen in women in their second pregnancy, thirteen in their third, and thirty-seven in their fourth or succeeding ones.

The woman's age does not seem to have any marked influence over the production of this accident. Nevertheless, the organic alterations which constitute a predisposition are more unusual in early life than in advanced age.

As the male child is ordinarily somewhat larger than the female, this, according to Dr. Clarke, would be a predisposing circumstance; thus, in twenty cases of rupture, mentioned by Dr. M. Keever, fifteen were male children; and of thirty-four cases by Collins, twenty-three of the children were boys.

The rupture may be seated either in the body or neck of the organ. When it affects the cervix, it is highly important to ascertain whether it only involves the sub-vaginal portion, or whether it invades that part situated above the insertion of the vagina; because the former is attended with very little danger, and occurs very frequently; indeed, it takes place at nearly every labor, just at the instant when the head is clearing the orifice, and it is scarcely ever followed by any unpleasant symptoms. The last, on the contrary, presents the same dangers, and has similar consequences with the ruptures of the body. Therefore, we need only mention here the lacerations that are limited to the orifice, and which do not extend beyond the vaginal insertion; and all that we are about to say concerning the uterine ruptures refers exclusively to those in the body of the womb and in the supra-vaginal portions of the neck. These latter are the more frequent, and they are located somewhat oftener on the posterior than on the anterior face.

§ 1. Causes.

Rupture of the uterus always supposes a distention of the organ, and this distention is most frequently dependent on pregnancy. The uterine walls become softened, in consequence of the modifications they undergo; their thickness is a little diminished at certain points, and they become more supple, more elastic, and therefore better calculated to support a slow and gradual pressure; for owing to this suppleness, they can yield without rupturing, though their distention renders them less fitted to sustain a sudden and forcible shock. By this distention, and the increase in volume to which it gives rise, the uterus is forced to ascend above the superior strait; and thenceforth it is no longer protected by the osseous walls of the pelvis, and, consequently, is more exposed to external violence, from which it was shielded during the non-gravid state. Coming, from its situation, in immediate contact with the abdominal parietes without the intervention of any other body, it is subjected to the unequal pressure which the rapid and irregular contraction of the abdominal muscles during any violent efforts may make upon it.

Pregnancy, and the modifications thereby impressed on the uterus, are therefore the essential predispositions to rupture of the uterus. As shown by Bandl, almost all ruptures of the uterus take place in the lower segment, below the ring in what has been designated recently as the obstetrical cervix. Here excessive thinning takes place when the descent of the fœtus is prevented from any cause, the conditions most favorable to it being contracted pelves and shoulder presentations.

1. *Predisposing Causes.* — Under this head we must include everything that can augment the distention or diminish the resistance of the uterine walls, as, for instance:

A. A great abundance of the amniotic liquid; the presence of several children, &c.

B. The extreme thinness of the uterine walls, which is met with in certain women, and which cannot be accounted for.

[Thinning of the walls of the uterus is most common in women who have had many children, and consequently predisposes them to spontaneous rupture. Turning, in such women, is more dangerous than in primiparæ, because the thin walls of the womb are more readily lacerated.]

C. An enfeeblement of the uterine parietes, dependent on causes which have operated at a more or less remote period, such as falls, blows, &c.; the contused walls inflame, become softened, and ulcerate; sometimes the rupture comes on during the same pregnancy, at others, several gestations may succeed it without any accident, and yet a rupture take place at a subsequent one.

The enfeeblement may likewise result from divers softenings; such as those designated by M. Dezeimeris as the atrophied, the apoplectiform, the inflammatory, and the gangrenous ramollissements, and those produced by organic alterations. We must add another circumstance, which is, in truth, very unusual, but whose influence has been fully demonstrated by several well-attested instances, namely, those women who have undergone the Cæsarean operation, and who have had the rare fortune to escape the grave

dangers that attend it, seem more disposed than others to uterine rupture in the following pregnancy: thus, Dr. Kayser has brought forward six cases in his excellent thesis, in which the patients, who had before been operated upon safely, have been compelled to submit to gastrotomy, in consequence of a rupture of the womb; three of these women died.

D. All the organic alterations, and all the degenerations of tissue of which the uterus may be the seat, such as the scirrhous, fibrous, or encephaloid tumors. The softening and ulceration of these morbid masses may render that portion of the walls they occupy thinner and weaker; oftener, on the contrary, they augment the thickness and even the consistence of the uterine tissue, but still act as predisposing causes of ruptures, at least during parturition, in the following way: the point thus affected not contracting, whilst all the others are in action, the resistance made by it would be wholly passive; and hence, whatever be its strength, it cannot hold out against the contractions of all the rest of the organ, the action of which, being aided by that of the abdominal walls, weighs with all its force, as it were, on that portion which does not participate in the general action; and if we suppose that any obstacle whatever prevents the ready engagement of the fœtus, the uterine effort, which is incapable of overcoming the resistance it encounters in clearing the superior strait, is felt at the point which does not contract, and consequently this latter becomes ruptured. And it is by a similar mechanism that the irregular or partial contractions may produce a rupture, by leaving some one point of the uterine walls in a state of inertia, whilst all the others are contracting.

During the labor, we must add everything that may render the parturition difficult, or require unusual and long-repeated contractions on the part of the organ. In this respect, all narrowing of the pelvis, every tumor that obstructs the excavation, all resistances offered by the cervix uteri, whether dependent on an agglutination of the lips, a degeneration of its tissue, or a state of spasm, or a considerable obliquity of the body, and the malpositions, as well as the malformations of the fœtus, may become causes of rupture of the uterus.

The ruptures of the uterus which take place during labor almost always occur after the rupture of the membranes. Still, James Hamilton reports a case in which the *membranes were found entire* at the autopsy.

2. *Determining Causes.*—A number of causes may serve to produce a rupture under the influence of some one of these predispositions; all of which, however, can be classified under two principal heads, namely, the external or traumatic, and the internal causes.

3. *External or Traumatic Causes.*—It is not without some hesitation that I venture to say a few words here about the traumatic lesions to which the womb is exposed as a cause of rupture; for it is well known that, at every period of life, this organ is liable to be injured by a projectile thrown by gunpowder, by any murderous instrument, or by the horn of an infuriated animal. But it must be remembered that the increased size of the organ, during gestation, exposes it then more than ever to this variety of lesions; though the consequences and the indications for treatment are, in other respects, nearly the same. Again we must add that perforations and lacerations of the uterus often result from ill-directed obstetrical manipulations.

The womb is also greatly exposed to compression or violent contusion of its walls, when it is developed by the product of conception. This compression may be mediate, that is to say, dependent on exterior causes, such as falls or blows on the abdomen, the pressure of this region by the backing up of a coach against a wall, or the passage of its wheels over the belly; or it may be immediate, that is, due to the violent contraction of the abdominal muscles. The effects of mediate compression are generally of little consequence, owing to the mobility of the uterus, the suppleness of its walls, and the *point d'appui* which the latter find in the surrounding parts. Nevertheless, they sometimes are followed by disastrous consequences: thus it is stated, in the old *Journal de Médecine*, that a woman had a rupture of the womb at the seventh month of her gestation, in consequence of having been pressed between a wall and a carriage. As before stated, the contusion of the ventral parietes seldom produces an immediate rupture; but the bruise and consecutive inflammation of the uterine structure may determine an ulceration, and then a perforation at some future period.

The ruptures by immediate compression, or those which result from the violent contraction of the abdominal muscles, seldom occur without the pre-existence of some one of the alterations of the uterine walls, considered above as predisposing causes. They generally follow a fit of coughing, sneezing, or vomiting, or take place during a paroxysm of anger; but they may likewise be occasioned by the patient's attempts to raise some burden, and by the forcible bending of the body backward, which latter cannot occur without the recti muscles of the abdomen becoming closely approximated to the vertebral column during the forward curvature of the trunk; in all these movements the womb is forcibly compressed between the abdominal muscles, which contract vigorously, and the posterior plane of the abdominal cavity. A rupture has been known to occur at all stages of gestation, from the earliest months up to full term, under the influence of some one of these causes.

4. *Internal Causes.*—Authors have incorrectly considered the enormous distention of the uterus during pregnancy as being capable of producing a rupture; for, although this distention is a predisposing cause, yet however great it may be, it cannot of itself give rise to such an accident without the previous existence of an organic alteration. The same is true of the violent and convulsive movements of the fœtus, whose impetus is too inconsiderable to occasion a rupture; and besides, the womb is fully protected against its influence by the amniotic liquid and the suppleness of the walls.

During labor, the uterine contraction is the most frequent determining cause; and though the walls of the organ were altogether passive in the course of gestation, they here play the principal part in the production of the rupture.

After the membranes are ruptured and the waters entirely discharged, the walls of the uterus are applied directly upon the fœtal ovoid. Now, in the doubled-up condition of the various parts of the child, numerous projections and irregularities are presented, which make the resistance at its different points very unequal. Consequently, some parts of the uterus are more or less stretched over the projecting parts, and, to use Madame Lachapelle's expression, some of the muscular fasciculi act in a wrong direction, whilst others, finding a firm support, contract with greater energy.

The equilibrium of the forces is then, says M. Taurin, broken at several points of the womb, and the organ contracts irregularly. The non-compressed, healthy, and thicker parts contract with greater power, and draw upon the parts in the vicinity; the latter, already distended by the fœtal projections, become still thinner, their resistance yields more and more, and at last, incapable of longer resistance, they give way under the more powerful contractions of the neighboring parts.

Such would be the course of affairs, more especially in an unfavorable position of the fœtus,—one of the shoulder, for example.

We would add further, that when the labor is prolonged greatly, the pressure of the fœtal projections upon the walls of the uterus may cause their inflammation, ulceration, or even gangrene, all of them circumstances likely to facilitate rupture.

Deformities of the pelvis, by presenting a mechanical obstacle to the passage of the fœtus, also constitute a predisposition to rupture; but even here, the contraction is the determining cause. In some other cases, the hard and unequal projections presented by the irregularly contracted circumference of the pelvis may produce a direct rupture of the lower segment of the uterus, or of the walls of the cervix. Thus, we may readily conceive that a too great anterior projection of the sacro-vertebral angle, as also the prominent ridge sometimes presented by the superior and posterior face of the symphysis pubis, might bruise, or even tear, the part of the uterus which is strongly compressed between it and the head of the fœtus. M. Taurin mentions a case in his thesis in which M. P. Dubois attributed to this compression a rupture comprising a part of the vagina, the whole anterior surface of the neck, and which extended up the left side of the body of the uterus.

The child's active movements are as foreign to the laceration that takes place in parturition as to those that occur during pregnancy. For, according to the observations of M. Duparcque, if this movement is effected during the relaxation of the walls, their suppleness and extensibility enable them to yield to this force; but if, on the contrary, it takes place while the contraction lasts, the resistance which they then present would require a far greater impetus to overcome it than any that can result from even a convulsive movement of the fœtus. The contraction is therefore the sole determining cause; but, for it to produce a rupture, its action must be favored by one of the predisposing circumstances before indicated, the influence of which is easily understood.

These spontaneous ruptures hardly ever take place except in labors at term, and appear impossible in abortions at four or five months. A case which removes the smallest doubt as to the possibility of such an accident within the first six months of gestation, has, however, been communicated to M. Danyau by M. Castelneau. A woman died almost suddenly in consequence of a profuse hemorrhage, and it was found that the neck of the uterus and the vagina were ruptured, the former through its entire length and the latter at its upper part. The accident occurred, in all probability, during contractions which expelled the ovum very rapidly; for although no portion of it remained in the uterus, the organ presented every appearance of one which had attained the usual development at five months of gestation.

However, it must not be forgotten that rupture of the womb has often occurred during parturition, from the imprudent manipulations made with a view of terminating the labor. For how often has an application of the forceps, a resort to version, or a difficult extraction of the placenta performed by inexperienced hands, — how often have all of them been followed by the early death of the patient, and a laceration of the organ been detected at the autopsical examination! In fact, cases of this kind are mentioned by nearly all authors. I have seen a uterus, the lower two-thirds of whose body on the right side had been torn away by the embryotomy forceps; and, in another case, I found at the *post-mortem* examination a perforation in the right superior part of the body of the womb, produced by the attempts which a practitioner had made to separate a firmly-adherent placenta.

The injudicious use of ergot has been referred to by authors as a frequent cause of this accident. Meigs has seen three cases, Bedford four, traceable to this cause. Jolly found that, in 33 cases of rupture, ergot had been largely given, and was, perhaps, the exciting cause of the disaster.

The same author mentions 71 cases of rupture occurring during podalic version, 37 directly traceable to the use of the forceps, and 10 caused by the cephalotribe.

[I repeat, therefore, that spontaneous rupture of the uterus is an event of rare occurrence, whilst lacerations produced by the manipulations required in turning, or the introduction of an instrument, are comparatively common. I have met with but a single case of spontaneous rupture, but, unfortunately, have seen quite a number of traumatic lacerations resulting from badly performed operations. The most skilful operator, without any fault of his own, may be the involuntary cause of rupture and cannot be justly censured; yet it is nevertheless true, that almost all such occurrences are the immediate consequence of want of skill or the use of too great force in the introduction of the hand or an instrument.]

§ 2. Symptoms.

The signs of rupture of the uterus are easily made out; for most frequently the laceration takes place suddenly after some violent effort that has necessitated a forcible contraction of the abdominal muscles. It is manifested by an exceedingly sharp pain just at the point where the accident occurred, which makes the patient scream out from the intensity of suffering. This acute, or, as Desormeaux describes it, agonizing and cramp-like[1] pain, is accompanied by a sound of tearing or cracking, loud enough, in some cases, to be heard by the surrounding persons. This pain soon changes to a sensation of numbness, and is followed almost immediately by swooning; the patient becomes pale, her pulse sinks, and she falls into a state of syncope. These primary phenomena are the only ones that are manifested when the

[1] According to Dr Robertson, when a rupture takes place in consequence of a contraction of the pelvis, it is preceded by cramp pains and a tendency to pressure at a circumscribed point of the hypogastrium. This cramp pain is caused by a compression of the uterus between the child's head and the promontory of the sacrum or some other prominent osseous part. A pain of this nature existed in a high degree in a woman in whom the anterior lip of the cervix uteri was considerably tumefied, and was also situated much lower than the head; Dr Robertson succeeded in relieving it, by pushing up the tumefied lip during the interval between the contractions.

pregnancy is not far advanced, and when the uterus has not ascended high enough to be easily accessible; or, else, when the ovum, having engaged in the lips of the wound, plugs it up in such a way as to prevent any effusion into the abdominal cavity. A deceitful calm may thus succeed the storm, and the symptoms be only renewed after several hours, or even days, when the uterus, by contracting, shall expel the parts it incloses into the abdominal cavity. In the opposite cases, and more especially in the advanced stages of gestation, we can readily detect the softening and depression of the hypogastric walls by an examination of the patient; for, instead of feeling the hard, globular tumor formed by the womb in this region, we simply find the yielding, depressible walls of the abdomen, and still lower the more or less reduced and distorted neck of the uterus. The patient who, at the instant of rupture, or shortly after, experienced a gentle heat diffusing itself through the abdomen, now feels some strange movements, or an unusual weight at a point where she never had them before; and the accoucheur himself detects the presence of the child in a spot where it should not be, and he can now distinguish its movements and the prominences it offers much more clearly than usual. But these active motions of the fœtus soon cease to be apparent, though their final disappearance is ordinarily preceded by an unusual and almost convulsive agitation; most generally, a little blood escapes from the vulva, in consequence of the detachment of the placenta, but this phenomenon may be wanting, especially in first pregnancies. Where the accident occurs during labor, the pains, that were hitherto strong and energetic, disappear at once.

The most conclusive signs are furnished by the touch; thus, during gestation, the finger can detect a change in the position of the womb, and the want of the volume which it generally has at the stage of pregnancy the woman supposes herself to have arrived at. Sometimes it can even feel a part of the fœtus situated externally to the womb, and depressing the upper part of the vagina. During the labor it finds the bag of waters to become suddenly collapsed, or no longer projecting through the os uteri, and yet without the escape of any liquid by the vagina. The presenting part of the child, which, a few moments before, was accessible to the finger, has now gone up, and perhaps disappeared altogether; the cervix uteri has shrunk up, and the orifice is much less dilated than it was previously

If an attempt be then made to pass the hand into the uterine cavity, perhaps it will find this cavity wholly obliterated by the retraction of the walls; or possibly it may encounter the intestines there, or else only a part of the fœtus, the rest having escaped into the belly. The seat and extent of the laceration can thus be determined, and, in some instances, the hand may even be made to penetrate through into the abdomen.

When all these phenomena are met with, there can be no doubt in regard to the nature of the accident, but it is not always possible to recognize them so clearly; for if the child, instead of being displaced, remains in the cavity of the womb after the rupture, it may happen that the signs furnished by the vaginal touch, and the abdominal palpation, will be altogether wanting. In this case, the diagnosis is very difficult, and the cause of death is disclosed only by the autopsy.

[Experience, or, if the expression be preferred, personal acquaintance with the accident, may enable one to suspect the occurrence of laceration in many of the cases. Suppose an accoucheur to be called to a case in which turning, or an application of the forceps or cephalotribe, has been attemped; his first thought will be to ascertain the fact that no rupture has been produced by the manipulations. He will, therefore, learn the number and nature of the manœuvres employed before his arrival, and then proceed to examine the patient. When rupture has occurred, the woman is almost always in a state of great prostration, pale and with altered features. The breathing is accelerated and the pulse very quick. Pressure on the abdomen produces severe pain on one of the sides of the uterus, being that which corresponds to the rupture. Touching causes the discharge of a little blood, the appearance of which has, in our view, a certain importance; for we have thought that, in such cases, it was brownish or syrupy in appearance. When rupture takes place, the presenting part of the fœtus often ascends and becomes movable; elevation and mobility of the presenting part ought, therefore, to be well considered, especially when they occur at an advanced stage of the labor. This explains why turning, so difficult in some cases on account of contraction of the uterus, becomes suddenly very easy after a rupture. Whilst practising the touch, if the finger be carried very high, the laceration may sometimes be reached and the intestines felt through it. This removes all doubt in the matter; but it is often impossible to reach the seat of the rupture, and then the accoucheur must be guided by the signs mentioned above in forming his diagnosis, which he will verify after delivery by introducing his hand into the uterus.]

§ 3. Prognosis and Termination.

The prognosis of uterine ruptures is exceedingly unfavorable; for they nearly always prove fatal to the child, and expose the mother to an almost certain death. Nevertheless, its gravity varies according to the extent and the seat of the lesion, and the consecutive phenomena to which this gives rise.

Some cases have been reported in which the great disorder in the organism produced by the rupture, and the escape of the blood, waters, and fœtus into the abdominal cavity, caused instantaneous death. But, most generally, some particular phenomena, or symptoms, occasioned by the accidents consecutive to the primary lesion, precede the fatal termination; which latter may result either from hæmorrhage, from the inflammations and suppurations created by the prolonged sojourn of a foreign body in the peritoneal cavity, or from the operations necessary for its extraction.

A. *Hemorrhage.*—Flooding is the most frequent, and at the same time the most speedily fatal, of all these accidents. Its source is evidently in the torn vessels of the womb, especially when the rupture takes place at the point of the insertion of the placenta; but when this point remains intact, it principally comes from the utero-placental vessels which have been torn by the detachment of the after birth; since the membranes at the rupture, when this occurs at some distance from the placenta, usually furnish but little blood. As a general rule, only a small quantity of it reaches the exterior, while, on the contrary, it is effused abundantly into the belly along with the amniotic waters and the body of the child, which have passed in a great measure into the peritoneal cavity, and the whole also with the abdomen enormously. Again, this effusion is especially profuse in those cases in which the waters have escaped, and the intestines lie in the wound, feeling only a

to prevent its issue. The ruptured margins being hindered from coming together, the lacerated vessels continue to pour out their blood, until the hypogastric walls oppose a resistance to the effusion, which is always too late to prevent death; and the latter may thus take place without being preceded by any sign that would lead us to suspect the rupture. Again, it may happen, even when the delivery is effected immediately, that the contraction is not sufficiently energetic to obliterate the calibre of the vessels entirely, and the hemorrhage continues long enough to destroy the patient.

The effusion ordinarily takes place into the sac of the peritoneum; but when this serous tunic is not implicated in the solution of continuity, the blood infiltrates between it and the uterus, gains the duplicature of the broad ligaments, and may thus get into the cellular tissue of the pelvis and loins. In such cases, a layer of black blood is found interposed between the peritoneum and the womb, where, by becoming exactly modelled on the external surface of the organ, it assumes its form, and may thus by its livid color be mistaken for a gangrenous state of this viscus. (Duparcque.)

Nevertheless, the uterus may be ruptured, without being necessarily followed by a profuse hemorrhage; as where the laceration takes place at a point which is moderately provided with vessels, in the vicinity of the neck, for example. On the other hand, it may happen that, the ovum remaining intact after the accident, the fissure becomes filled up in a measure, either by a portion of the membranes or placenta, or a part of the child; or the body of the infant may be partly driven into the abdomen, whilst the borders of the laceration become so retracted around it that the salutary compression thereby produced prevents a continuation of the hemorrhage. Again, when the entire ovum passes rapidly through the fissure into the peritoneal cavity, the uterus prevents or at least diminishes the bleeding by contracting at once, whereby a powerful obstacle to the further discharge of blood is created.

B. *Inflammation.*—When the patient does not die from the loss of blood that immediately follows the rupture, a momentary calm succeeds, but the presence of foreign bodies in the cavity of the peritoneum gives rise to an inflammation of this membrane, which is the more serious as they are the larger; and even where the accoucheur has succeeded, by any mode whatever, in removing the fœtus and after-birth, inflammation, though less to be dreaded, may still result from the operation or measures necessary for this extraction, and may speedily terminate in death.

C. *Escape of an Intestine through, and its Strangulation in, the Fissure.*—A considerable portion of intestine has been known to pass through the laceration in the uterus, and to become strangulated by the retraction of the organ. This accident, which would not be suspected, if the fœtus were still inclosed in the womb, or if the latter had completely retracted, might, however, be detected immediately after the delivery; but should it escape detection, it would infallibly terminate in death, as occurred in the case reported by Percy, and reproduced by M. Deneux. Consequently, whenever there is reason to suspect a rupture of the womb, it is necessary to carry the hand up into the interior of the organ as soon as the delivery is effected, and (following the plan of Rungius) to press back the intestines into the abdomen, and then keep the hand in the uterine cavity until the organ is sufficiently retracted, and the fissure diminished, to prevent a return of the hernia.

D. *Recovery.*—Some women have recovered from all these dangers; a few have even undergone gastrotomy, and survived the consecutive accidents; while in others, the fœtus and its appendages have escaped bodily into the peritoneal cavity, and have there given rise to inflammatory symptoms which gradually passed off. Salutary adhesions were formed, as a consequence of the inflammation, whereby the fœtus and its appendages were inclosed in a pseudo-membranous cyst that isolated them from the surrounding parts; the latter became habituated to this new vicinage, which has continued for a variable period, and sometimes even throughout life. But this cyst, like those which surround other extra-uterine products, may become the seat of a fresh inflammatory action; its walls contract new adhesions with neighboring organs, and we sometimes find ulcerations and perforations occurring, after the lapse of many years, by which the cavity of the cyst is made to communicate with that of the intestine or bladder, and the last pieces of the skeleton are finally expelled through the urethra, the rectum, or the vagina.[1]

Where the child remains in the uterine cavity, notwithstanding the rupture, and the contractions do not immediately expel it by the natural passages, the same phenomena may be subsequently manifested; that is, the inflamed and ulcerated uterine tissue contracts adhesions either with the abdominal parietes or with those of some adjacent organ, and the fœtal debris then escape through the ulcerated and perforated wall, or else by the natural openings of the excretory organs. (Duparcque.)

§ 4. Pathological Anatomy.

Every portion of the uterus may become the seat of rupture, though there are some parts which are more liable to be affected than others; such are the inferior regions, the fundus, and the lateral portions of the body, and the superior or supra-vaginal parts of the neck. Moreover, the seat of laceration varies according to the cause that has given rise to it, as also to the period at which it takes place; thus, during gestation, the body is always ruptured, but during labor, on the contrary, these solutions of continuity are met with about the neck or inferior portion of the body, which is, in general, thinner, and not so well supported as the rest of the organ. Where the accident has resulted from some external compression, the walls usually become lacerated towards the lateral parts; when it has resulted in consequence of a contusion, the bruised point is ordinarily the one that afterwards gives way; and if the rupture has been preceded by any organic

[1] For instances of recovery, see: Peu, *Pratique des Accouchements*, 341; Hamilton's *Outlines of Midwifery*; James Hamilton, *Select Cases in Midwifery*, 138; Jos. Clarke, *Trans. of Association*, vol. i.; Douglas, *Essay on Ruptures of the Uterus* p. 7; Lobstt, *Dublin Med. Essays*, p. 343; Frizell, *Trans. of Association*, vol. ii. p. 15; Ross, *Lond. Jour. of Med.*, vol. iii. p. 377; Kite, *Mem. of Med. Society*, vol. iv. p. 243; Powel, *Med. Chir. Transact.*, vol. xii. p. 537; Birch, *Ibid.*, xiii. p. 537; Smith, *Ibid.*, p. 373; MacIntyre et Brook. *Med. Gazette*, vol. vii et Janvier, 1829; Hendrie, *Amer. Jour. of Med. Science*, vol. vi. p. 351; Davis, *Obst. Med.*, vol ii. p. 1070.

According to Lusk, the results of gastrotomies, performed for the removal of the child after its escape into the abdomen are extremely encouraging. Tyler's 8 cases showing 76 per cent. of recoveries, those of Jolly 69 per cent., and the United States statistics, collected with indefatigable zeal by Harris, 53⅓ per cent.

alteration, the laceration takes place at the diseased point. It may happen, says M. Dubois, that the part of the uterus affected with chronic disease, instead of being weaker, is really stronger and more resisting than the healthy parts alongside, which are the ones to give way. (Taurin, *Thèse.*) The front and back walls, being protected by the anterior and posterior planes of the abdomen, would seem to be perfectly sheltered from such accidents; this, however, is not always the case, for instances have been reported which prove the possibility of ruptures of this kind. According to Dr. Roberton, when the laceration is caused by a narrowness of the pelvis, it may occupy any portion of the womb, though more frequently, perhaps, it involves its posterior inferior part; which is explained, in his opinion, by the pressure that the sacro-lumbar prominence makes on this region. Sometimes, also, it takes place in the anterior inferior part, and is then due to the osseous projections located on the internal face of the pubic symphysis. The anterior superior wall is oftener injured by foreign bodies; indeed, it is the almost exclusive seat of ruptures produced by wounds.

Nothing can be more uncertain than the extent, form, and direction of the uterine ruptures; since they vary in size, from a little hole that is scarcely capable of admitting the end of the finger, up to a large fissure extending over two-thirds of the fundus, or periphery of the neck, or, indeed, occupying nearly the whole organ. It may have a longitudinal, a transverse, or an oblique direction, or it may affect a circular form, as often happens about the neck; or it may run in a straight line, or in a zigzag course. The divided margins are rarely observed to present a clear and regular section; but, instead, they are most usually found unequal, haggled as it were, contused, and ecchymosed to a more or less considerable extent. If the rupture has resulted from some organic alteration, the anatomical traces of the previous disease are found at the affected point. Lastly, if the patient has not died till several days after the accident, the autopsical examination will verify the presence of the matters effused into the peritoneum, and the unequivocal marks of a violent inflammation of this serous membrane; besides which, the borders of the uterine fissure will sometimes be red, livid, and inflamed, and occasionally even gangrenous.

The lacerations of the womb do not always implicate the whole thickness of the organ, for the tunics, that enter into the composition of its walls, do not all possess the same degree of elasticity; and hence it is possible for them to be ruptured separately. Madame Lachapelle says, a fissure of the orifice propagated to the neck, and even to the body of the organ, has very often divided the whole muscular layer, leaving the serous membrane intact. I have particularly observed, she continues, fissures of this kind on the sides of the womb which were covered by the duplicature of the broad ligament, whereby the wound was prevented from extending into the abdomen. M. Dupareque furnishes a very similar case; and Dr. Collins reports nine others in which the peritoneum was not injured, though the muscular layer of the neck was lacerated to a considerable extent. I have likewise had an opportunity of observing an identical instance in the practice of Professor Velpeau, in which I was enabled to verify the truth of the remark made by M. Cruveilhier; namely, that the laxity in the adhesion of the perito-

Fig 1

Fig 2.

PLATE IX.

FIG. 1.

Transverse Rupture of the Anterior Cervical Wall.

(After Spiegelberg.)

The rent occurred in a universally contracted, flattened pelvis, during the seventh labor, three hours after the liquor amnii had drained off. Face presentation.

The rent passes close under the internal uterine orifice, through the whole thickness of the anterior wall of the neck and part of the posterior and right side.

FIG. 2.

Narrowing of the Vagina by an Ovarian Tumor.

(After S. Merriman.)

f. f. Vaginal Walls. *d.* Ovarian Tumor. *r. r.* Rectum. *u.* Urethra.

neum to the cervix, and to the sides of the uterus, fully explains why this membrane is so rarely involved in those cases in which a considerable rent has occurred in the neck, and why the effusion of blood then takes place between the uterine tissue and the peritoneal serous membrane. Cases have occurred in which the blood collected in very large amount, and even the fœtus itself, completely expelled from the uterine cavity, has been found in the species of sac formed by the detached serous membrane.

In some more rare cases, the muscular structure resists, and the peritoneal layer alone gives way. Where this occurs, the disease can scarcely be recognized during life, for the phenomena that precede death are either those of a hemorrhage, or of a violent peritonitis; but a large quantity of blood is ordinarily detected at the *post-mortem* examination, and, by searching for its source, one or more fissures of a variable extent are found in the uterine serous membrane. To the case of this kind reported by Ramsbotham, we can now add several others that have recently been published; one of the most curious of which is that furnished by H. Partridge (*Arch. de Méd.*, t. 19), where a great number of lacerations running transversely, were found at the *post-mortem* examination; these were more or less curved, and were variable in depth, and they extended from half an inch to two inches in length. A shred of peritoneum had been completely detached and hung within the abdomen, thus laying bare the naked fleshy tissue from which it had been torn.

§ 5. Treatment.

The measures that have been proposed for the treatment of ruptures of the womb, may be designated as the prophylactic and the curative. The object of the former is to avert the influence of the causes that have been described as predisposing to this accident; and we refer for an account of those whose existence it is possible to foresee, such as the divers obstacles to delivery, to the chapters on Dystocia; and with regard to the others, as it is usually impossible even to suspect their presence, we shall pass them over altogether.

A rupture of the uterus is only serious from the disastrous consequences which follow it; therefore, the prophylactic measures must be directed, not against the rupture itself, but rather against the consecutive accidents to which it gives rise. The best mode of preventing them is to facilitate the retraction of the organ by immediately extracting the fœtus and its appendages; for it has been shown that it is the hemorrhage, and the inflammatory symptoms which follow the child's displacement and subsequent sojourn in the cavity of the abdomen, that are to be particularly dreaded.

Perhaps the indications for treatment presented under such circumstances will be best illustrated by supposing the rupture to take place at three different periods of the puerperal state, namely, during the parturition, during the latter months of gestation; and during the early stages of pregnancy.

1. *During the Labor.* — In this case the infant may either remain within the womb, or it may have been driven out of the uterine cavity.

A. If the child remains *in situ*, its extraction, either by the pelvic version

or by the forceps, is of course the only admissible operation. When the forceps are used, it is very important, as M. Dubois remarks, that the child should be fixed in its position by the hand of an assistant applied to the walls of the abdomen, in order to prevent its ascending into the peritoneal cavity through the fissure. The introduction of the blades also demands especial care when the neck is ruptured transversely, in order to avoid passing them into the abdomen through the rupture. But where any obstacle appertaining to the pelvis or the soft parts opposes its delivery by the natural passages, gastrotomy ought certainly to be performed if the infant is living and viable, and craniotomy when it is dead, or when it has suffered severely from the slowness of the labor.

B. If one part of the child has passed into the abdominal cavity through the fissure, while the other portion of it is still inclosed within the uterus, we must endeavor to deliver it through the natural passages, by acting on the portion retained in the womb, or which has already engaged in the os uteri or vagina. But if the presenting part is high up, and the hand or instruments cannot get a sufficient hold upon it, it will be necessary to search through the fissure after the feet, and bring them down into the vagina. But here another difficulty arises, for the escape of the waters and a part of the fœtus may have determined a contraction of the womb, and the lacerated margins, participating in this retraction, may be found so closely applied to the child's body as to render a passage of the hand impossible; under such circumstances, we might follow the example of certain accoucheurs, and open a passage by enlarging the wound in the uterus with a cutting instrument, which would be far preferable to the performance of the Cæsarean operation.

C. Supposing the child has passed into the abdominal cavity, and that the organ has not as yet retracted, that the os uteri is sufficiently dilated or dilatable, and the uterine fissure is still large enough to permit the hand and fœtus to pass through, which conditions are scarcely ever met with when the rupture occurs at the cervix, we ought, as in the preceding case, to go after the feet even into the cavity of the abdomen, and bring them back through the lips of the wound, the neck of the uterus, and the vagina, and thus extract the fœtus by the natural passages. After this delivery, the hand should again be introduced into the uterine cavity, with the threefold object of extracting the after-birth, of determining the contraction of the organ, and of preventing the strangulation of a loop of intestine, if any portion of the bowel had engaged in the fissure.

Should the placenta have happened to fall into the peritoneal cavity, an effort should be made to extract it without delay, by a fresh introduction of the hand through the rupture. An attempt should be made at the same time to remove the clots which had formed in the abdomen.

When such a manœuvre is impossible, the only resource is in the Cæsarean operation; unless, being fearful of the disastrous consequences of this operation, the accoucheur should conclude to abandon the fœtus in the peritoneal cavity, and allow the mother to run all the dangers to which this determination must necessarily expose her. If the child's death were positively ascertained, the arrest of the hemorrhage might *perhaps* authorize

this latter procedure, more especially if he should not see the patient until several hours after the accident; but it would never be excusable if the infant were living, and if he were not satisfied that the uterus, by being completely retracted, had obliterated the vessels which furnished the blood; for otherwise, gastrotomy should be resorted to at once.

2. *During the Latter Months of Gestation.*—Here, likewise, the extraction of the ovum is the wisest course to pursue; indeed, it is imperiously indicated when the child is living, and the pregnancy has advanced beyond the seventh month; and it may be accomplished by resorting either to gastrotomy, to a forced dilatation of the os uteri, or to incisions made directly on the neck of the womb. The Cæsarean operation will be preferred whenever the fœtus is displaced (see *Cæsarean Operation*); but if it is still resident in the uterine cavity, we must endeavor to dilate the os uteri artificially, which will generally be feasible when the patient is near term, more especially if she has previously borne several children; and the introduction of the hand might likewise be facilitated by incising the periphery of the cervix. But these attempts ought to be made with the greatest care, and should they offer any serious difficulties, and require too much time, we must renounce them at once, and open a passage through the abdominal wall.

3. *During the Early Months of Gestation.*—Most of our leading teachers advise us to abandon the patient in these cases to the resources of nature, to abstain from all operations, and to be content with combating the consecutive symptoms as they arise. Three new indications are now presented, says M. Dupareque, namely: 1. To prevent or arrest the disorders of innervation, by raising the *morale* of the woman, who is instinctively struck with fears and inquietudes, and by administering the diffusible antispasmodics by the mouth, the skin, or the respiratory passages; 2. To combat or prevent the hemorrhage by abdominal compression, by refrigerants, compression of the aorta, &c.; and, 3. To prevent or combat the inflammation which ordinarily follows the displacements of the ovum, by the employment of local and general antiphlogistics.

Playfair, in summing up the considerations upon treatment after rupture, gives the following rules:

1. If the head, or presenting part, be above the brim, and the fœtus still in utero, forceps, turning or cephalotripsy, according to circumstances.

2. If the head be in the pelvic cavity, forceps or cephalotripsy.

3. If the fœtus have wholly, or in great part, escaped into the abdominal cavity, gastrotomy.

Dr. Robert P. Harris, who has by indefatigable labor collected and analyzed all the cases of puerperal laparotomy in the United States, and therefore speaks with the best authority in regard to the operation, says: "*I should cases where the state of the woman will warrant it, I believe that the abdomen should be opened and sponged out, and where the uterine wound gapes, that it should be closed by sutures.*"

He advises operation even when the child can be readily delivered *per vias naturales*. If the body or fundus has been freely rent, and blood and liquor amnii have escaped into the abdominal cavity, the removal of which he regards as of the greatest importance. "*there is no security except by the act of opening the abdomen and cleansing it out.*"

"Of 40 cases in the United States, 21 women and 2 children were saved. One mother and child were saved by an immediate operation with a pocket-knife in 1869."

ARTICLE II.

RUPTURE OF THE VAGINA.

The walls of the vagina may also be lacerated during the labor. But, owing to the differences that exist, according to the portion of the canal these ruptures may occupy, it has been customary to study separately the lacerations at its upper and lower extremities, and at its middle part. In general, the two latter are of little consequence, or, at least, the dangers and indications they present belong rather to the province of the surgeon than to that of the accoucheur; for, with the exception of thrombus of the vulva, which may, as has been stated, require the intervention of art during labor, all the other lacerations are only unfavorable to the woman, inasmuch as they expose her to vesical or recto-vaginal fistulas, which do not claim our attention here. On the contrary, the lacerations that occupy the superior extremity of the vulvo-uterine canal require a cursory notice, because they, like the ruptures of the lower part of the uterus, may become causes of dystocia. The lacerations of the upper part of the vagina may result either from traction or from direct pressure. The former may be owing to the uterine contraction, to the artificial pressing back of the uterus or presenting part of the child, and to every act of the abdominal walls, and every movement of the trunk, calculated to elevate the womb. According to M Dupareque, the uterine contraction alone may produce a transverse laceration of the vagina in the following manner: the child's head being wedged in at the superior strait, or more or less engaged in the excavation, and unable to advance any further in consequence of the resistance it encounters, and the womb still continuing to contract, the latter withdraws itself, as it were, from the child. The margins of the orifice are gradually drawn up towards the fundus of the organ, whereby they get clear of the head in a great measure, and sometimes altogether. Whence it happens that the vagina becomes subjected to an active traction, proportioned to the energy of the uterine pains; and consequently, as it offers only a passive resistance to the distention and compression it undergoes, it is gradually enfeebled, and ultimately gives way.

The mode in which the efforts sometimes made during version for the purpose of pressing up the presenting part, or for penetrating through the os uteri by main force, so as to carry the hand towards the fundus of the organ, act in the production of these lacerations, is easily understood. And this transverse rupture, having once commenced, may extend far enough to separate the uterus almost entirely from the vagina. Those fissures and vaginal perforations which result from direct pressure, are ordinarily produced by an improper application of the forceps, or by the prolonged sojourn of the head at the superior part of the excavation.

The signs of this rupture, and the accidents to which it gives rise, are very

similar to those of rupture of the uterus, excepting that they are less intense and not so dangerous. The pain is less acute at the time of its occurrence, being sometimes even confounded with the labor-pain; and the existence of a laceration is only suspected, some time after, when searching for the cause of the arrest of the labor. Here, likewise, the child may either preserve the place it occupied, or may pass partially or wholly into the abdomen. Most generally there is no displacement when the head had previously engaged in the excavation, and the rupture has taken place either at the junction of the vagina with the cervix or else at some point above the head. Nevertheless, should the laceration be very extensive, the head may remain fixed in the excavation, while the trunk is carried back into the abdominal cavity by the subsequent retreat of the womb, the orifice of which, being no longer retained by the vaginal connections, mounts up and retracts towards the fundus of the organ, thus abandoning the fœtus which it cannot expel. It seldom happens that the whole child escapes into the abdomen, and, when this does occur, it always results from pushing up the head during the ill-directed efforts to effect the delivery. But, whether this passage is partial or complete, it ordinarily takes place in such a way that the pelvic extremity engages first in the lacerated orifice.

A considerable portion of intestine has sometimes been known to escape through a rupture of the vagina; it is evident that in such cases reduction should be effected as soon as possible. Although it would seem that this operation ought not to be attended with difficulty, it has occasionally proved impossible. Burns quotes from Dr. Kerver a case of rupture of the vagina complicated with the escape of a portion of intestine an ell long. It was impossible to reduce it, and gangrene ensued. The fæces passed by the vagina; but, after some time, were discharged by the anus, and the patient recovered.

The prognosis is much less unfavorable than that of uterine ruptures; because there is far less danger from the hemorrhage and consecutive inflammations, and, besides, it is always possible to extract the fœtus by the natural passages.

This extraction through the vagina is, therefore, the only indication which presents itself. If the head is not displaced, apply the forceps; but if some other part presents, the feet should be sought after through the rupture in the vagina, which it may be necessary to enlarge if too small or too resisting. The Cæsarean operation must not be performed, even should the fœtus have passed completely into the abdominal cavity, unless a contracted pelvis should render it impossible to extract it through the natural passages.

CHAPTER XI.

OF PUERPERAL HEMORRHAGE.

Hemorrhage is certainly one of the most frequent and at the same time most dangerous accidents that can occur to puerperal women, whether before, during, or after parturition.

We designate as *puerperal hemorrhage* (or the hemorrhage that occurs in the puerperal state) every hemorrhagic accident that pregnant women may be affected with, either during gestation or in the course of the labor and lying-in; thus comprising, under this denomination, not only the losses of blood that have their source and seat in the genital organs, or in the fœtus and its appendages, but also all the effusions that may take place into the tissue of the principal viscera as a consequence of an *exaggeration* of the modifications impressed on the general circulation by pregnancy.

During the labor, whether the hemorrhage takes place in the lungs, the stomach, or the brain, the only thing to be done is to combat it by the usual means, if the dilatation of the os uteri is not sufficiently advanced to admit of an artificial termination of the labor. But in the contrary case, the accoucheur should apply the forceps at once, or resort to version, and thus relieve the patient as promptly as possible from the danger that threatens her.

Hemorrhage attendant upon delivery of the placenta, will be studied in connection with the other difficulties which complicate its expulsion.

ARTICLE I.

OF THE CAUSES OF UTERINE HEMORRHAGE.

The causes of uterine hemorrhage have been divided into the *predisposing*, the *determining*, and the *special* causes.

§ 1. Of the Predisposing Causes.

We must place in the front rank of the predisposing causes, all the disorders in the general circulation that are induced and kept up by pregnancy, and which are manifested by palpitations of the heart, by obstructed respiration, varicose swellings of the veins of the lower extremities, and by the fulness and greater activity of the pulse; but, above all, it is important, in order to understand the mode of action of the causes described below, to bear in mind the changes that have occurred in the structure of the womb itself; which changes have been studied in detail, when describing the anatomical phenomena of gestation, but which we again bring forward in a summary way, for the better illustration of the subject under consideration.

The mere fact of conception produces a state of orgasm in all the genital organs, the uterus particularly, which determines a considerable afflux towards these parts. In some women, of a sanguineous temperament, this state of irritation is not confined to the hypertrophy of the mucous membrane, but the development of its vascular apparatus is attended or followed by an exhalation of blood, and, in the course of a few days, a uterine hemorrhage takes place that seems to be only a menstrual return, but which, in reality, interrupts a commencing pregnancy. In certain cases, this fluxion is not limited to the uterine vessels; for, when very considerable, it causes an aneurismatic or a varicose swelling in the neighboring parts, such as the vessels of the broad ligaments, which run to the tube or ovary. These trunks occasionally give way, and produce a mortal hemorrhage, as Al. Leroy says he found to be the case in two women who died a few days after marriage.

During the first month of its intra-uterine life the ovum occupies only a

very small portion of the uterine cavity, all the rest being filled with the pouch formed by the epichorial decidua and parietal mucous membrane; and hence, being free and floating, and having as yet contracted but feeble adhesions with the walls of the organ, the product of conception can only be developed by imbibing the juices secreted on the internal surface of the womb; (see *Nutrition of the Fœtus;*) which secretion requires a much greater activity in the circulation of the uterus, and may become a cause of flooding, under the influence of the least disorder. Somewhat later, the placenta begins to be developed, and with it those numerous vessels which, coming from the internal surface of the uterus, and the external one of the chorion, appear, so to speak, to run to meet each other; then they interlace without inosculating, and ultimately become united, forming a mass that is held together by a species of flaky lymph, a product of the uterine secretion.

Now, who does not see in this process of vascular organization, in this copious secretion that is constantly going on, and requiring so much activity in the circulation of the organ, a continual predisposition to hemorrhage? For, if any vivid moral impression, or any violent physical commotion, disturbs the harmony that presides over this new creation for a single instant, by causing a derangement in the circulation, the just relations established between the ovum and the womb are at once destroyed; and the blood, being forced too rapidly into these recently formed vessels, overcomes the resistance of their feeble walls, and a flooding results in consequence.

At a still more advanced period of the gestation, when the placenta is organized, the production of hemorrhagic accidents is singularly favored by the double circulation of which it is the seat, by the great development of the uterine vascular apparatus, and by the peculiar structure of the utero-placental vessels. Quite recently, M. Jacquemier has carefully studied the influence of each of these circumstances, and the following summary will serve to illustrate the results of his inquiries.

When we examine the uterus of a pregnant woman in the latter periods of gestation, after having undergone its usual transformations, we are struck with the development of its vascular system; for the trunks of the four arteries that nourish the organ have increased in size, and their divisions or ramifications in the texture of the womb are wonderfully multiplied. The vessels that existed before the impregnation have more than doubled their calibre, and a great number of others that did not exist, or rather were not visible, have successively formed, become enlarged, and attained a considerable size. We have hitherto mentioned (see art. *Pregnancy*) the extraordinary development of the uterine veins; and it is only necessary to recall here the feebleness of their walls, which are composed of a single coat, their adhesion to the uterine tissue, and the numerous divisions sent by them into the cavity of the organ, which penetrate directly or indirectly into the substance of the placenta itself. It results from this arrangement that, in the arterial system of the womb, the blood passes from trunks of a moderate size into cavities very numerous and spacious in proportion to the volume of the trunks; which cavities are formed by the numerous ramifications given off from the latter in the substance of the uterus; while, in the venous apparatus, a much greater disproportion exists between the trunks

of the uterine and ovarian veins and their branches, so that the blood passes from very large cavities into narrower tubes.

This arrangement has been considered by M. Jacquemier as a cause of the retardation in the uterine circulation, and as being calculated to produce a venous stasis, followed by an engorgement of this system, and, as a consequence, the rupture of the vessels and hemorrhage; which venous rupture is further favored by the want of resistance on the part of the utero-placental veins. According to his view, all the causes under whose influence floodings are found to result, merely act by producing this engorgement of the uterine venous apparatus; and hence the immediate cause of hemorrhage is the rupture of one of the vessels appertaining thereto.

But we cannot fully embrace this theory, so far, at least, as regards the hemorrhages that occur during gestation, for we do not believe that the retardation in the circulation is so extensive as M. Jacquemier has described. Although the blood arriving by the uterine arteries passes into the larger cavities constituted originally by the arterial and afterwards by the venous ramifications (the uterine sinuses), yet it seems to us that this cause of delay would be compensated by the rapidity with which the blood contained in these venous capillaries must pass into the trunks where they empty; and even by virtue of that very law of hydraulics quoted by M. Jacquemier in favor of his theory, namely, "When a liquid flows in full stream through a tube, the quantity of this liquid which, at a given moment, traverses the different sections of the tube must everywhere be the same. *Consequently, as the tube becomes larger, the rapidity diminishes; but increases as the tube becomes smaller.*" If, therefore, the course of the blood is slackened in the arteries by its passage from the main trunks into the ramifications, it must be accelerated in the veins by its passage from the ramifications into the trunks; and hence there must be a compensation in its rapidity.

But an infinity of circumstances may destroy this harmony; and which series of vessels will then be the seat of the congestion, and afterwards of the rupture? M. Jacquemier supposes that some point of the venous system will always yield to the first; for he says, "Every part of the uterine vascular circle is not equally exposed to this species of rupture; *and the arteries would even be wholly exempt, unless they were the seat of some morbid lesion.* The utero-placental arteries themselves would rarely be a primitive seat of rupture from the mere impetus of the blood, although the surrounding delicate tissue in which they ramify supports them in a much less perfect manner than the elastic tissue of the womb, and besides is easily torn; but the utero-placental veins, from their situation and organization, can afford but a very *moderate* resistance, which will frequently be overcome." No doubt, the venous parietes are less resistant than the arterial ones; but which of the two has the greater stress to bear? Do not all the causes, under whose influence the uterine congestions and subsequent hemorrhages are produced, act first on the arterial, before being perceptible in the venous system? And is not the plethoric condition first manifested by a fulness of the pulse. M. Jacquemier supposes that, as the circulation is impeded in the vena cava inferior, it must determine a reflux of the blood contained in these vessels; which reflux would be primarily felt in the uterine veins

and then in their ramifications; and that this would likewise be favored by the particular structure of the uterine veins themselves, *which are destitute of valves.*

This absence of valves must certainly favor the reflux of the venous blood; and it is possible that, under the influence of some of the causes enumerated by this writer, a congestion and then a venous rupture might be the primitive phenomena; but we cannot admit that this is generally the case in the hemorrhages that occur during gestation. And whilst acknowledging that our friend has rendered an important service to the profession, by calling attention to a particular variety of mechanism in the production of uterine hemorrhages, we must persist in considering his theory as being only applicable to a small number of cases. (See *Archives Générales de Médecine*, 1839.)

I must yet bring forward another anatomical peculiarity, which, perhaps, will serve to reconcile two conflicting opinions. It has been said by some persons that all uterine hemorrhages proceed from a separation of the placenta; while others contend that many of them result simply from an exhalation of blood from that portion of the internal surface of the womb not occupied by the placental insertion. Doubtless, the floodings that occur during pregnancy are most frequently caused by a rupture of one or more of the utero-placental vessels; but it is not to be supposed that this rupture is the only source of hemorrhage, for we have already seen that, in the early months of gestation, the ovum only occupied the uterus in part, all the rest of its cavity being filled with the tumefied and very vascular mucous membrane, and that, in consequence of the greater activity of the circulation, an exhalation of blood might take place from the internal surface of the womb. (See page 552.) This fact is unquestionable; but even after the placenta is completely formed, and the ovum occupies the whole cavity of the womb, there are still, as described elsewhere, some arterial and more particularly some venous radicles found existing externally to the placental mass, that might give rise to a hemorrhage, in which the proper utero-placental relations would be in no wise concerned.

From the foregoing, it would appear that a hemorrhage may take place during gestation: 1st, by sanguineous exhalation from torn capillary vessels, especially during the early stages; 2d, from a rupture of the veins, and oftener, of the utero-placental arteries, properly so called; 3d, from a rupture of the veins and arterioles that ramify in the substance of the decidua beyond the placenta.

Among the anatomical modifications impressed on the uterus by gestation, the development of its muscular structure has recently been pointed out by M. Gendrin as a predisposing cause of hemorrhage. At the close of pregnancy, the womb is formed of three evident layers; and it is the relation of these three muscular laminæ with the vascular one that explains, according to his view, the influence that it has over the production of flooding.

This triple muscular layer may, under the influence of various external or internal irritants, become affected with spasms, which produce irregular contractions in some part of the organ. He states that such spasmodic contractions are very frequent after the third month, and that they are often

noticed after external, moral, or physical impressions, or the tumultuous movements of the fœtus, or, indeed, when the vitality of the latter has ceased. The patient first becomes conscious of it by some peculiar sensations and movements in the uterine globe; and when the gestation is somewhat more advanced, the hand, applied on the abdomen, enables us to ascertain that the sense of movement felt by the woman is dependent on a real contraction of the uterine walls; which give rise to certain irregular elevations, that slip about and become displaced under the hand by something like a peristaltic movement, of which the patient has always a very distinct perception. These contractions frequently accompany the hemorrhage, sometimes they precede it, and seem to be the earliest phenomena that succeed the action of the pathological cause. Although they may be considered as resulting in the first place from the discharge of blood, and, possibly, from the formation of coagula, whose presence incommodes and irritates the womb; yet, in the second place, they must be regarded as an active cause in the production of the flooding.

In fact, it is impossible for any contraction to take place in the external muscular layer, without modifying the circulation in the subjacent vascular one; hence, when the vascular plexus of this intra-uterine lamina is irregularly compressed by the muscular contractions of the organ, the blood must flow back into some part of the placental disk, thereby determining a partial congestion, which may cause the rupture of one of these feeble venous ramifications, and, as a consequence, a sanguineous extravasation. But the influence of the spasmodic action is not limited to this; for, by effecting a retraction that is confined exclusively to segments of the uterine globe, they necessarily draw upon the placental adhesions, and may perhaps rupture them.

Besides these local modifications, whose power to produce hemorrhage it is impossible to deny, there are still numerous other circumstances that we might point out, which have the same effect. But, let it suffice to recall the physiological and pathological changes that gestation impresses on all the functions, which have already been studied under the titles of the Physiology and Pathology of Pregnancy. Let us remember the almost constant presence of serous plethora, the habitual fulness of the pulse, flushing of the face, and increased activity of nutrition and circulation which are manifested in most plethoric women during the early months; also, that susceptibility which the least emotion excites and irritates; that delicacy of sensation natural to most nervous females, but carried to the highest degree in pregnant ones; and, finally, let us recall the fact that, during the gravid state, the uterus is, as it were, the common centre, upon which all the general disorder caused by any moral or physical excitement is directed. Then we will understand the reason why most authors have considered a plethoric constitution, a profuse normal menstruation, and the lymphatic temperament, which so often accompanies great nervous irritability, as predisposing causes of puerperal hemorrhage; why plethoric females are so often affected with flooding at the return of the monthly periods, since their habit determines at these times a greater activity and a more intense congestion in the womb; why venereal excesses have often been followed by a profuse flooding, by causing a long-

continued and over-excitation in all the genital organs; and, lastly, why every circumstance calculated to determine or to keep up an unusual activity in the general circulation, and particularly a more considerable afflux of fluids towards the gestatory organ, has been at all times considered as predisposing the woman to hemorrhage; such, for instance, as fatigue, the frequentation of balls, of plays, and crowded assemblies, where the air is impure and at a high temperature; prolonged watching; overheating diet, and the use of alcoholic drinks; as well as all local irritants, such as the abuse of drastic purgatives, which, by producing excessive irritation of the intestines, may react on the uterus; hip-baths, the frequent application of leeches to the vulva, the existence of any organic alteration, or an acute inflammation in the neighboring organs, or in the womb itself; because all these circumstances are calculated to maintain an habitual state of congestion toward the womb.

§ 2. Determining Causes.

The prolonged action of the predisposing causes just enumerated may eventually produce a hemorrhage; and thus, after having acted for a long time as the predisposing, finally become determining causes. But in addition to these, some other circumstances have been enumerated by authors, which might be designated as *accidental determining causes*. These are so numerous and varied that, to exhibit them, it would be necessary to bring forward nearly all of the cases that have ever been published. Besides, all these causes may be referred either to acute moral emotions, or to physical disturbances; for example, to a violent passion; the sudden arrival of some unexpected person or intelligence; a fit of anger; sharp bickerings, &c.; to the jolting of a rough carriage; to riding on horseback; a fall on the feet or nates; blows on the abdomen; efforts to carry or lift some burden; to cough, vomiting, &c., &c.,) &c. (See art. *Abortion*.)

But these causes, the list of which I might have lengthened greatly, do not all have the same mode of action; for some of them, such as most of the moral ones, act primarily on the whole organism, and only react on the womb secondarily; while others, like the generality of the physical causes, are addressed, as it were, directly to the gestatory organ, and, by the shock they communicate, have a tendency to disturb the relations existing between it and the product of conception. It is generally conceded that the former determine a more considerable afflux of blood towards the uterus, than an engorgement of the utero-placental vessels, and finally the rupture of those vessels; or, if the pregnancy is but little advanced, the afflux of blood is followed by a sanguineous exhalation from the internal surface of the organ. But how, it may be asked, is the hemorrhage produced after a fall, blow, or any physical commotion whatever, especially in the latter stages of the gestation? And is the separation of the placenta, which is then a very common occurrence, the primitive phenomenon, and has it caused a vascular rupture? Or, indeed, has this rupture taken the precedence, and has the effusion of blood between the after-birth and the uterus resulting therefrom produced the separation of the placenta? The latter opinion appears to me the more probable; for, although there can be no doubt that

the feeble bonds of union which attach the placenta to the uterus may be ruptured at once, as a consequence of some very violent shock or fall from an elevated place, since, under like circumstances, the very substance of the solid organs, the liver in particular, has been lacerated, yet this certainly does not happen in a large majority of cases; because the ovum forms a full sac, which is in immediate contact with the walls of the cavity that incloses it, and the placenta is sustained by the waters and the fœtus within and by the uterine wall without. The organ and its contents constitute a whole, that cannot be separated by any general concussions unless they are very severe. Wherefore, so long as the membranes remain unruptured, it is difficult to conceive that the separation could be effected otherwise than by the effort of the blood to escape into the cavity of the womb.

In conclusion, although these physical and moral disturbances are enumerated by authors as being capable of producing a hemorrhage, it must not be supposed that they constantly have this unfortunate result; indeed, their influence is far from being always in proportion to their violence and intensity. In general, they only act and are followed by flooding, because a predisposition exists in the patient which the determining cause excites and brings into play. I might mention individuals in whom the least excitement has been followed by a hemorrhage that proved fatal to the fœtus, whilst others have borne the most severe moral disturbances without accident; and several cases were cited in the article on Abortion, which prove that the most violent physical shocks oftentimes give rise to no disorder whatever. We must, therefore, admit the intervention of a predisposing cause in the majority of cases; a cause which often, indeed, plays the most important part in the production of the accident.

§ 3. Special Causes.

Independently of the general causes just studied, there are some which might be termed special causes, because they depend on certain peculiarities in the position and structure of the ovum; and the influence of which is particularly apt to be felt at an advanced stage of gestation. We allude to an abnormal insertion of the placenta, to a rupture of the umbilical cord, and to some other peculiarities about to be mentioned.

1. *Insertion of the Placenta upon the Lower Segment of the Uterus.*—Nearly all the older authors detail cases in which the placenta was found inserted over the neck of the womb at the time of labor. But some of them altogether misunderstood the cause of this disposition, and supposed that the placenta had been detached in totality from the point where it was originally inserted, and had fallen from mere gravity on the neck of the womb; while others, who had observed it to be still adherent by one margin to some point of the periphery of the cervix, concluded that this adhesion was only accidental and merely occasioned by the clotted blood; *which, says Deventer, sometimes glues the placenta so closely to the orifice that it might be taken for an excrescence of the part.* There were others, again, who had noted the fact with much care, without attempting to give any explanation of it; Levret was among the first to direct attention to this important point, for he demonstrated its frequency and danger, and studied the causes and proper methods

of detecting it. However, this abnormal insertion had been pointed out long before the time of Levret; for Giffart, in narrating a case of hemorrhage, wrote, in 1730: "I cannot receive as absolutely true the opinion of those authors who say that the placenta is always attached to the fundus uteri, for in this case, as in many others, I have every reason to believe that it adhered on the internal orifice, or very near to it; and that, in dilating, the latter occasioned the separation of the after-birth, and as a consequence the hemorrhage." (*Observ.*, 115 et 116.) Heister (*Institutiones Chirurgicales*, chap. cliv. part i.) likewise says: "Some moderns think that the adhesion of the placenta over the neck is a cause of hemorrhage; and, therefore, that the more the os uteri dilates the more abundant is the flooding." Finally, we find in Portal's work, which appeared in 1685, observations which show conclusively that he is entitled to the honor of having first described this faulty insertion. In six of his cases, *the placenta presented, was in entire contact with the orifice of the womb, and was adherent throughout.* The author even endeavors to show how the hemorrhage occurs in these cases, giving the explanation which was afterwards accepted by Levret and many others.

As we detailed the various circumstances, when studying the anatomy of the placenta, which, according to most authors, determine the point of attachment of this vascular mass, it will be unnecessary to revert to them here. We would merely observe that the placenta has various relations with the orifice, giving rise to several grades or varieties of faulty insertion. Thus, the placenta may be inserted near the orifice or on the orifice, covering it entirely or in part. These various insertions have received different names, as, *marginal*, when the placenta extends very near the circumference of the orifice; *incomplete* or *partial*, when it covers it only in part; *complete* or *central*, when it covers it entirely; and, finally, we have the term *intra-cervical* insertion when, as seems to be proved by some cases of Madame Lachapelle's, the ovum has happened to insert itself in the cavity of the neck itself. Further observations are, however, required to establish the latter as a true variety.

[According to Dr. Sirelius, the placenta undergoes important changes in form whenever it happens to be attached over the mouth of the womb. Sometimes, though rarely, it is spread out in a membraniform layer over almost the entire surface of the chorion (membranous placenta); at other times there are two separate placentas, one large and the other small; but most commonly it is imperfectly divided by a fissure extending from the free edge to its middle, giving it a horse-shoe form. In the two latter cases the fissure, which either completely divides the placenta or leaves it in the form of a crescent, is occasioned by obliteration of the villi of the chorion, and always corresponds to the internal orifice of the uterus. This remark in reference to the pathological anatomy of the case may have a practical application in regard to the treatment.]

The insertion of the placenta over the os uteri has been considered, since the days of Levret, as an inevitable cause of hemorrhage during the last three months of gestation, and in the course of the parturition. The flooding, then, says Gardien, is an immediate result of the gestation, and particularly of the labor. Most modern writers, supposing that the modification

occasioned by pregnancy in the disposition of the neck towards the latter months are the sole cause of the hemorrhages that then occur, have adopted the same opinion; and the following, in their view, is the mechanism whereby the discharge is produced. Up to the fifth month, the body of the womb undergoes numerous changes, but after that period, the neck is also involved and participates therein. (See *Pregnancy.*) The diminution in its length is accompanied by a more considerable enlargement of its base on a level with the internal orifice. The placenta, being fixed and immovable on the spot where it is implanted, cannot follow this spreading out of the upper part of the neck, and hence the bonds of union which it has contracted with the womb necessarily become ruptured, as do also the utero-placental vessels; and this rupture produces a more or less considerable discharge.

But it is only necessary to recall what was stated in the article on Pregnancy, to be convinced that this explanation, which is founded on a false, though hitherto admitted fact, ought to be rejected; since it is at the lower part of the neck, at least in women who have previously borne children, that the eversion of its cavity commences; and, in all, the internal orifice often remains closed until the last few weeks of gestation. The neck, therefore, does not spread out at its superior part, and, consequently, we are not to search there for the cause that produces the hemorrhage, when the placenta is inserted over the cervix. The following explanation, by M. Jacquemier, appears to me more plausible: During the first six months of gestation the uterus is developed more especially at the expense of the fibres of the superior part of the body or fundus of the organ; while in the last three months, the fibres appertaining to the lower third of the womb are developed in a rapid manner, and the cavity of the organ is enlarged in consequence of the distention and growth of this lower part; a proof of which is, that the body of the uterus, which was pyriform in the earlier months, is perfectly ovoidal in shape towards the close of pregnancy; and I will further remark, that the development of the placenta is far more rapid in the first six than in the last three months. Now, this double circumstance seems to me quite sufficient to account for the production of hemorrhage; for when the placenta is attached to the fundus, its growth is simultaneous with the enlargement of that portion of the uterine walls on which it is implanted, and it is evident that no hemorrhage need occur; but when the after-birth is inserted over the cervix uteri, or on some adjacent point, the contrary must necessarily ensue, because the growth of the placenta is nearly completed, whilst a more considerable extension of the lower third of the womb has yet to take place. Of course, the placenta can no longer participate in this rapid development, by conforming to the increase of the uterus, and by following the extension of the wall on which it is inserted; and hence it spreads out from the centre towards its circumference, the fissures between the cotyledons become larger, and its different lobes are thus widely separated; but the growth of the inferior wall of the uterus is so rapid in the latter months, that this mechanical enlargement of the placenta, on which M. Jacquemier has particularly insisted, is no longer sufficient to prevent the tension of the utero-placental vessels, or of the cellular tissue in which they ramify; and this tension being ultimately carried to an extreme, all

of these cellulo vascular adhesions give way and become ruptured, and thus give rise to the production of hemorrhage. If this be the true explanation, there is no necessity for invoking a diminution in the length, and a spreading out of the upper part of the neck, which really does not take place. By it we can also comprehend the possibility of a circumstance that is inexplicable under the theory generally received,—I allude to the hemorrhages that occur when the placenta is attached to the lower part of the womb, or some point adjacent to the internal orifice; for it is not because the afterbirth is implanted over the cervix that a flooding takes place during the latter months of pregnancy, but because it is in relation with the inferior third of the uterus.

The explanation usually given is true only with regard to those sanguineous discharges that come on in the latter weeks of gestation or during the parturition; for then, the spreading out of the cervix uteri, and its complete effacement, must necessarily have a great influence over the production and profuseness of the flooding, in those cases where some point of the circumference of the placenta is in immediate relation with the neck; but still more especially in those where the insertion takes place, as it is said, centre for centre.

The hemorrhages of which we are speaking occur, besides, most frequently in the latter weeks or during the labor.

Although a hemorrhage is usually considered to be inevitable under such circumstances, yet it may not appear even during the labor; and the dilatation of the os uteri may be effected without the loss of a drop of blood. This absence of discharge is doubtless a rare circumstance; but its authenticity at the present day is well established by numerous cases; authors only differing as to the explanation given of it. Thus Walter supposes that in cases of this kind there is probably a larger and more easy communication between the venous and arterial radicles of the uterus than usual, whereby the blood may pass from the arteries into the veins without escaping externally; and M. Mercier imagines that the exhalant vessels of the womb are then in a state of constriction, of perversion of their sensibility, which is sufficient to retard the course of the blood; but these two explanations appear to me inadmissible. M. Moreau remarks that, in the reported cases, the children were dead, and perhaps had been so for several days; now, says he, as soon as the infant dies in the womb, the cessation of the fœtal circulation occasions changes in that organ; the blood being arrested in the vessels, coagulates there; the latter retract, or even become obliterated, and no more blood reaches the womb than what is necessary to its nutrition, since the stimulus that heretofore determined a greater quantity to it, no longer exists; and hence the dilatation of the orifice may be effected without hemorrhage, notwithstanding the vessels are torn that united its borders to the placenta. It seems to me that, in spite of objections raised against it, this view is correct, at least as regards some cases. In others, it may be as M. Jacquemier remarks, that the accomplishment of the delivery without accident is due either to the entire separation of the placenta, or to its detachment on one side only to a point just beyond the uterine orifice; so that the dilatation can progress without increasing the detachment; the vessels pre-

viously torn having been stopped by coagulated blood. Thus we may account for cases in which hemorrhage had occurred several times during pregnancy, without reappearing at the time of labor.

Lastly, if the rupture of the membranes should occur at the commencement of labor, it is possible that the uterine retraction which would naturally follow a discharge of the waters, and the compression that would be made by the head on the part left uncovered by the separation of the placenta, might entirely obliterate the lacerated vessels, and thus put an end to the hemorrhage; and yet the fœtus be living.

2. *Rupture of the Cord, or one of its Vessels.*—It is now an incontrovertible fact that a rupture of the umbilical vessels, or of the omphalo-placental trunk itself, may take place; and, inexplicable as it may seem, it can no longer be called in question, since it has been successively observed by such men as Delamotte, Levret, Baudelocque, Nægèle, &c. This rupture, and the hemorrhage to which it inevitably gives rise, may be occasioned either by some disease of the vascular tunics, by a particular arrangement of the vessels of the cord, or by a brevity of the latter, whether this be natural or dependent on numerous turns made around different parts of the fœtus.

A. "The umbilical vessels," says M. Velpeau, "are sometimes ruptured: I am in possession of several examples of the kind; but it is because they were previously in a diseased state." In a case reported by M. Deneaux, the blood escaped through the umbilical vein, which was varicose at several points. The subjoined curious instance, which I reported in my Inaugural Thesis, might probably be attributed to a state of disease in the ramifications of the vessels of the cord; in this case, the hemorrhage occurred between the chorion and the fœtal surface of the placenta, in consequence of a rupture of all the ramifications of the umbilical vessels. This case, which I believe is unique, and hitherto but little known, has generally been misinterpreted by those who have referred to it, and I therefore feel justified in republishing it here.[1] I must confess, that it is not without some hesi-

[1] Rocques-Marie-Joseph Herce, aged twenty-nine years, pregnant for the fifth time, and advanced to the seventh month of gestation, was brought to the Hôtel-Dieu on the fifth of May, at midnight. The midwife that accompanied her informed us that she had had sharp pains since five o'clock in the evening. The patient appeared much enfeebled; her face was pale and slightly jaundiced; and this debility had been caused, the midwife further told us, by a hemorrhage that had lasted since the fourth month of pregnancy. The flooding had considerably increased from the moment the pains began; and it was owing, added the attendant, to an implantation of the placenta over the os uteri. The patient was placed in the ward of Saint-Benjamin, where we made a vaginal examination, the result of which was as follows: The os uteri was dilated to the size of a five-franc piece, and the cervix was soft, wholly effaced, and did not contract at all. The finger, having been introduced into the uterine orifice, detected a hard, resistant, ovoid body, which we recognized as the fœtal head in the first position. No soft body whatever was interposed between our finger and the cranial teguments, and we concluded that, if the placenta were inserted over the neck, it was not at least by its centre. By carrying the semi-flexed finger around the internal periphery of the neck, we endeavored to ascertain whether the after-birth was not attached to one of the lips of the orifice; but as we found nothing of the kind, the error of the midwife was manifest, and though unable to determine the cause of the hem-

tation that I attribute the flooding, in this instance, to a previous disease and rupture of the umbilical vessels. For, might not such a rupture be

orrhage, we did not hesitate to reject her opinion. The finger being still in the orifice, we felt the womb contracting moderately, in consequence, probably, of the irritation produced by the touch. The hemorrhage was arrested, the head engaged at the superior strait, and the patient, though feeble, still retained a sufficient degree of strength to second the efforts of nature. We thought there was nothing further to be done than to encourage the woman about her condition, and to persuade her to aid the uterine contractions that began to be developed quite strongly, as much as possible. In fact, the labor advanced very well, without a return of the hemorrhage, and at four o'clock in the morning she was delivered of a dead child of seven months, which was pale and colorless, but exhibited no signs of putrefaction. Its delivery was followed by the expulsion of three large clots of blood, each of which was as big as the fist; but the flooding was not again renewed. The cord was about the usual length, and there was no circulation in it; but we were not a little surprised, after having cut it, to find that it was no longer attached to the mother; but that it exhibited, on what should have been the placental extremity, a kind of membrane, in the centre of which it seemed to be implanted. The membrane was nearly as large as an ordinary placenta, and was evidently continuous with the debris of the bag of waters; and we at first supposed it to be one of those membranous placentas spoken of by authors. This view appeared the more probable, as some vessels, evidently arising from the termination of the cord, ramified in its substance. We then thought the opinion of the midwife might possibly be correct, as the want of thickness in the placenta might have prevented us from recognizing it. When we returned to the patient, at eight o'clock in the morning, we found her doing very well; but what was our astonishment, when the nurse brought forward a placenta, which the woman had expelled after our departure! Thenceforth all our suppositions were groundless, and it was necessary to resort to an examination of the pieces for a better explanation of the phenomena offered by this patient. The following was the result, as all the members of the Anatomical Society have since been enabled to verify: The uterine face of the placenta was smooth and normal, but its fœtal surface was entirely deprived of the portion of chorion that ought to cover it, and was irregular, nodulated, and clearly exhibited the anfractuosities that separate the cotyledons. It was covered over by thick clots, and the debris of the torn and separated vessels that ordinarily ramify on its surface could readily be detected; the loose extremity of some of these vessels was an inch long. By a further careful examination of that portion of the pouch hanging to the cord, which we had taken for a membranous placenta, we were enabled to detect on the surface that covered the after-birth, some vascular debris, which had been continuous with those observed on the fœtal surface of the placental mass. The cavity of these vessels was patulous, and some were obstructed by fibrous coagula of recent formation. The principal divisions were intact and permeable to the blood.

From that examination, we felt authorized to conclude: 1. That the placenta was not inserted over the neck; 2. That the hemorrhage was not produced by a detachment of the uterine surface of the after-birth; but that it resulted from a separation of that portion of the bag of waters that was attached to the after-birth; that this separation was effected at first on some point of the fœtal surface of the placenta, then over a greater extent, and finally separating this mass altogether from the fœtal envelopes; 3. That, becoming more and more considerable, this separation had produced a gradual increase of the hemorrhage; and it was only when the detachment had been completed, and the bleeding had become excessive, and all communication being interrupted between the mother and child, that the pains were manifested, and the abortion took place. This examination likewise enabled us to account for the cessation of hemorrhage from the time of the patient's arrival at the hospital, as also for the quantity of coagulated blood that escaped after the delivery of the child. In fact, as soon as we touched the woman at the time of her entrance, the head being up to

consecutive to an effusion of blood proceeding from one of the utero-placental vessels, the ramifications of which, as elsewhere demonstrated, get beneath the membranes that cover the placenta? This effusion would have produced a separation of the chorion, and then a rupture of the umbilical vessels. The profuseness, and the return of the hemorrhage, and the continuance of the child's life up to the commencement of the labor, would certainly be more easily explained by this latter hypothesis than by the former. An attempt has been made to misconstrue this case since its first publication; and it has been said that numerous loops of the cord probably existed, or else that some artificial tractions had been made upon it; but I can affirm that nothing of the kind took place, and that the circumstance occurred just as I have described it.

B. The abnormal distribution of the umbilical vessels, which was pointed out in the description of the cord, may also produce a hemorrhage fatal to the fœtus, during the parturition. The subjoined case, described by M. Benckiser as occurring at the clinique of M. Nægèle, can leave no doubt on this point.[1]

engage in the pelvic excavation, thus acting the part of a tampon and preventing an external discharge; but the blood did not the less continue to escape and to accumulate internally, thus giving rise to the formation of coagula, and their discharge after the delivery.

[1] A countrywoman, about twenty-six years of age, was admitted into the hospital in November, 1830. Her labor commenced on the seventh of December at noon; by three o'clock the os uteri was dilated to the extent of an inch, and the tumor formed by the bag of waters could readily be felt. While exploring with the finger, an abnormal cord, about the size of a writing-quill, was detected in the substance of the membranes, running from behind forwards, and exhibiting no pulsation. After the rupture of the bag, the waters escaped, and were followed by a few drops of blood. The head was found in the excavation in the first position, and it then appeared that a fold of the cord had become placed between it and the right sacro-iliac symphysis; but a very feeble pulsation could be distinguished in it, and attempts to push it up were made to no purpose. As the labor was progressing actively, Professor Nægèle terminated the labor by the forceps. When the right blade was applied, a large quantity of water mixed with blood came away; indeed, this latter fluid had not ceased to flow during the four hours that elapsed between the rupture of the sac and the termination of the labor, and the patient must have lost six or eight ounces of it; the delivery of the placenta took place half an hour afterwards. The child, though pale and colorless, still presented some evidences of life, but it died in the course of a few minutes; it weighed six pounds and a quarter. At the autopsy, the fœtus exhibited signs of anæmia, and everything evinced that its death had been caused by hemorrhage. An examination of the after-birth discovered the source of the bleeding; the placenta had its usual form and texture, but the membranes were somewhat thicker and more dense, and their laceration was just sufficient to permit the child's escape; the umbilical cord was attached to the membranes at about two inches from the placental border; and, starting from this point, the vessels of the cord were no longer held together, but they separated and ramified in different directions on the membranes; and then, after these divers ramifications of the arteries and vein had run over their internal surfaces for a more or less considerable extent (though variable for each, from two inches up to ten), they entered the placenta, some at its centre, but the greater number by its margin.

The author of the thesis alluded to, carefully describes the course and disposition of these various branches; but, as the limits of this work do not permit me to give his description in detail, I will only quote the principal points. The first branch aris-

c. The shortness of the cord may prove a cause of its laceration, not only after the rupture of the membranes, but even before the commencement of the labor and the discharge of the waters; and thus produce that variety of hemorrhage which has been designated as the *intra-amniotic*. I repeat again, that I am unwilling to reject any fact, however extraordinary it may be, when it is advanced by experienced and conscientious observers, who

ing from the division of the umbilical vein at the point of its insertion in the membranes, ran towards the right, traversed a considerable portion of their internal surface, and was ultimately prolonged to the opposite border of the placenta; the rupture of the membranes took place just in this route at its most distant point from the placenta, and this had necessarily produced a rupture of the venous trunk just described: and to it, without any doubt, must be referred the flooding that occasioned the child's death, as proved by the autopsy. The mere descent of the cord could have no influence on its death; for, in cases dependent on that cause, the opening of the dead body exhibits the symptoms of congestion.

Dr. Panis, Professor of Midwifery in the Medical School of Reims, has kindly furnished me with a similar case:

"Madame H——, of Reims, thirty-six years of age, has had four children; her labors were fortunate, and the children were large and living. I was called to her in her fifth labor about six o'clock on the morning of the 17th of January last. I learned, on my arrival, that the waters were discharged at five o'clock, and that they were accompanied with blood. The motions of the child were felt the day before until evening. Mad. H—— had slept all night, and was only awakened by the rupture of the membranes. On examination I found the vertex in the left posterior occipito-iliac position, and the os uteri dilated to the extent of an inch and a quarter. At first, the labor advanced regularly though rather slowly; blood continued to flow, though in small quantity, and at ten A. M., Mad. H—— was delivered of a dead child, which was disengaged in an anterior position.

"Being surprised at the death of the child, whose face was but slightly colored and its development perfect, and whose motions had ceased to be felt only at the time the mother fell asleep, I sought for the cause of the accident, and found it in the umbilical cord as soon as I had extracted the placenta. The cord was, in fact, inserted upon the membranes, at the distance of about three inches from the placenta. The vessels composing it were separated, and, after traversing the membranes, entered the circumference of the placenta. One of these vessels belonging to the umbilical vein, was ruptured at the distance of about an inch and a quarter from its insertion in the placenta, precisely at the spot where the membranes themselves had been torn. I immediately concluded that death had been caused by the hemorrhage following the rupture of the vein. It also explained why the discharge of blood had occurred at the instant the membrane gave way. I have preserved the specimen, which will be placed in the Museum of the Medical School of Reims."

Although cases of this kind are very rare, they may nevertheless occur again, since this disposition of the vessels in the cord has already been reported quite a number of times; but it can only endanger the child when the rupture of the sac takes place in the course of one of the venous or arterial ramifications. Where the vascular trunk exists on the portion of the membranes engaged in the os uteri, as in the case under consideration, we might anticipate the consequences; but what measures should then be employed to prevent the flooding? It would appear to us advisable to retard the rupture of the membranes as much as possible, if they be still whole, and to terminate the labor immediately after their rupture. In the former case, the os uteri should be permitted to dilate sufficiently; but in the latter, an attempt ought to be made to terminate the labor before the discharge has been profuse enough to cause the infant's death. These measures would evidently be more urgent if, instead of a venous trunk without pulsation, it should be an arterial one, recognizable by its throbbing, which, from its position on the membranes, was threatened with laceration.

declare they have taken every precaution to avoid all sources of error, consequently, I admit that this rupture may take place, Madame Lachapelle and Boivin, and M. Velpeau, to the contrary notwithstanding. In such cases, the rupture has doubtless been favored by an abnormal weakness in the vascular walls, and by the diminished resistance of the sheath that surrounds the vessels; but it may be more particularly attributed to the tensions on the cord itself, that are probably produced before the membranes give way, by the immoderate movements of the fœtus; which movements are probably excited by the annoyance that the turns of the cord occasion it. After the discharge of the waters, and during the expulsion of the child, the shortened cord becomes stretched, and its tension augments as the head approaches the vulva; when, as a general rule, its rupture alone can permit the expulsion to be effected.[1]

According to most accoucheurs, this unusual shortness of the cord may give rise to flooding by determining a premature detachment of the placenta. But it appears to me that such a separation can scarcely occur from a mere dragging on the cord, because, during the uterine contraction, the placenta is strongly pressed by the womb externally, and by the amniotic liquid internally, or, still more, after the escape of the waters, by the body of the child. Now, these parts must evidently react on the fœtal surface of the after-birth with all the force of impulsion communicated by the contraction; of course, the fœtus can only advance, and, consequently, the tension of the cord can only take place under the influence of this contraction; and I repeat that, while it lasts, the placenta is moulded on and forcibly pressed against the parts contained within the sac, and, of necessity, cannot be separated from the womb. I believe, therefore, that a separation of the placenta from a tension of the cord is almost impossible during the continuance of the contraction; but it may take place before or during the labor, and prior to the escape of the waters, if the cord be very short and the movements of the fœtus are very active. As to those cases, in which it is commonly said the child is born with a caul, that is, where the head pushes the membranes before it, it may happen that the dragging to which these latter are subjected, being communicated to the placenta, may occasion its premature separation and give rise to uterine hemorrhage; more particularly where this body is not attached directly to the fundus of the organ.

§ 3. Rapid Contraction of the Uterus.

Sudden and rapid contraction of the womb may likewise produce a disastrous hemorrhage, by destroying the cellulo-vascular attachments of the placenta; for this contraction, which, when restricted to proper limits, is a physiological condition of labor, becomes a cause of premature separation of the placenta, when it takes place too rapidly or at too early a

[1] For further details relative to the rupture of the cord, see the observations of Portal, *Pratique des Accouchements*, p. 267; Lamotte, *Traité des Accouchements*, p. 362; Levret, *Accouchements Laborieux*, p. 199; Baudelocque, *Recueil Périodique de la Société de Médecine de Paris*, t. iii., p. 1; Nægèle, *Annales Cliniques d'Heidelberg*, 1826; and of Busch, *Siebold's Journal*, ann 1828.

period of the travail. This is apt to occur in cases of dropsy of the amnios, where a large quantity of the waters escapes at once; for the uterus then passes from an enormous bulk to a much more circumscribed volume than what comports with the dimensions of the fœtus on which it is applied. It likewise happens after the expulsion of the first child in twin pregnancies, for the contraction that follows this process may, by separating the placenta appertaining to the other twin, cause a flooding that might prove fatal to both mother and child, if a long interval should elapse between the two deliveries.

The hemorrhages that so often complicate a rupture of the body or neck of the womb, and those which constitute the thrombus of the vulva and vagina, have already been considered in separate articles, and we shall not again revert to them here.

ARTICLE II.

SYMPTOMS OF UTERINE HEMORRHAGE.

The symptoms of uterine hemorrhage may be divided into *general* and *local.*

1. *General Symptoms.*—In some cases, the flooding commences in so sudden and rapid a manner that the discharge of blood is the first symptom manifested; this is more apt to occur in those instances where the hemorrhage follows the violent action of some external cause. Most generally, the woman experiences, during the few days preceding the accident, some uneasiness in her limbs, a general and unusual malaise, a sensation of weight and of numbness in the pelvis, and a dull and obscure pain in the loins, in the upper part of the thighs and groins, which is augmented by the erect position, by strainings at stool, and by the act of urinating; and, in many cases, there is a constant desire to pass the urine. These phenomena, which are characteristic of a local uterine congestion, are accompanied by the symptoms of general plethora; that is to say, by pains in the head, vertigo, dimness of vision, flushing of the face, and by frequency and fulness of the pulse. After these general disorders have lasted some days, it is not unusual for the active movements of the fœtus to die away, and to become very feeble, or, perhaps, not at all perceptible to the patient. After the lapse of some time, varying from a few hours to several days, these precursory phenomena give way to the general symptoms of hemorrhage, which are the same as accompany every loss of blood: namely, pallor of the skin, feebleness of the pulse, and coldness of the extremities; the intensity of which, it is needless to add, varies according to the abundance and rapidity of the flooding, the strength of the woman, &c., &c.

2. *Local Symptoms.*—With regard to the local symptoms that characterize its existence, uterine hemorrhage has been divided into the external and the internal. The flooding is called external, when the blood flows to the exterior, and internal, when it is effused into the cavity of the organ; but we shall hereafter see that it may be both external and internal at the same time.

A. *External Flooding.*—A discharge of blood externally is of itself a sufficient sign of hemorrhage during pregnancy or parturition; but there

are certain peculiarities dependent on the various causes indicated above that demand attention, and which will be pointed out in detail in the following article. (See *Diagnosis.*)

B. *Internal Flooding.* — An internal discharge may take place, during the earlier months of pregnancy, and yet may escape detection; if, however, the amount of blood should be considerable, the clot formed by its coagulation constitutes a foreign body, whose presence excites colicky gripings and pains in the loins, and a feeling of weight about the fundament; and these symptoms obstinately persist until a miscarriage takes place. Besides which, as M. Baudelocque remarks, there are some instances where the symptoms of occult hemorrhage are either preceded, accompanied, or followed by an external discharge of blood. In the former case, the blood, finding a free issue outwardly, continues to escape until its further passage is prevented by the formation of a coagulum, which forces it to accumulate internally; in the latter, the effusion of blood into the cavity constantly goes on, until it reaches the orifice of the womb by gradually separating the membranes; while, in the third case, an external discharge will accompany the occult hemorrhage whenever one part of the blood has a free issue, but the other collects in the cavity of the organ.

At an advanced stage of the gestation, when the hemorrhage is more profuse, we must add to the precursory signs before mentioned a considerable and rapid development of the belly, and a greater resistance, tension, and hardness of the uterus than usual; sometimes even it presents a very irregular form, seeming to be divided into two parts, one of which is occupied by the ovum, and the other by the effused blood; and most generally the active movements of the fœtus disappear. In some few cases, a well-marked fluctuation has been detected.

Finally, when the flooding is first manifested in the course of the labor, the interval of each pain is characterized by the escape of clots of blood in greater or less profusion. This discharge of coagula can be explained by the fact that, during the interval, the child's head does not seal up the neck hermetically, and thus its orifice is left comparatively free, and the blood is permitted to escape.

Seat of the Effusion. — The point at which the accumulation of blood takes place in those internal hemorrhages that come on at an advanced period of gestation must necessarily vary, according to the part of the utero-fœtal vascular apparatus which has been the source of the flooding. For instance: —

1. The blood may be primarily effused between the uterine face of the placenta and the corresponding uterine wall; as the discharge progresses, it ordinarily dissects off the placenta towards some one point of its circumference, and is then effused all round the ovum, by displacing the membranes. But it may also happen that the whole placental circumference remains adherent to the womb, whilst its central portion is entirely detached, the effusion being limited by the margins of this mass; and the hemorrhage may be copious enough in such instances to kill the patient promptly, as the case of Laforterie (whatever may be said of it) fully proves.

The reader will likewise find, in the *New Medical and Physical Journal*, (1813 No. 38, p. 535,) the following case, which, though less known in

France than the one of Laforterie, is not the less extraordinary: "A lady, of a weakly constitution and delicate habit, was attacked in the latter months of pregnancy with a slight discharge of blood from the vagina, not amounting altogether to half an ounce, accompanied with alarming symptoms of exhaustion and debility. The os uteri was scarcely dilated to the size of a sixpence, and was in such a state of rigidity as precluded the possibility of affording any manual assistance. The lady in consequence died; and, on examination after death, it was found that a separation of the centre of the placenta from the parietes of the uterus had taken place, whilst its edges were completely adherent, forming a kind of cul-de-sac into which blood had been poured to the amount of a pint and a half, which had become coagulated within the cavity thus formed."

2. The blood may be effused into the proper tissue of the placenta, and thereby constitute those sanguineous collections which have been designated of latter time as *placental apoplexy*. The woman's life is never compromised by a discharge of this nature, but the death of the fœtus and, as a consequence, its premature expulsion, most generally results therefrom.

3. The blood may be effused on the fœtal surface of the placenta, as in the case referred to above; but the flooding here evidently must have been internal before it was external. Indeed, several observers have reported that they found coagula lying between the chorion and a portion of this fœtal aspect of the placenta.

4. The numerous observations detailed in the memoir of M. C. Baudelocque, prove that blood may be effused between the various membranous laminæ that constitute the amniotic sac, at all stages of pregnancy.

5. Lastly, notwithstanding the strictures which the cases narrated by Delamotte, Levret, Naegèle, Baudelocque, and others have been subjected to, they constrain us to believe that both a partial and complete rupture of the umbilical cord may take place; in consequence of which an effusion of blood is made into the cavity of the amnion.

ARTICLE III.

DIAGNOSIS.

A. *External Discharge.*—The difficulties hitherto described, (see *Diagnosis of Abortion*,) as complicating the diagnosis of hemorrhage during the first six months of pregnancy, are scarcely ever met with at a more advanced period. In fact, it is so rare to find women regular as late as the last three months, that every discharge of blood from the vulva at that period may be considered as a symptom requiring immediate attention; for, at the most, we could only confound a very slight hemorrhage with a return of the menstrual discharge, and, in both cases, the precautions to be taken would be the same; or, at least, if indifferent in the one, they might prove very serviceable in the other.

When a hemorrhage does come on in the course of the last three months of gestation, or during labor, the question arises, what is the cause? But this question, though very important both as regards the prognosis and the treatment, is sometimes exceedingly difficult to answer. It has been shown that often, perhaps even, according to certain authors, the most frequently,

it is owing to an insertion of the placenta either over the os uteri, or on some adjacent point; and most of them go further, and endeavor to point out the signs whereby this abnormal situation of the after-birth may be recognized.

The absence of any signs is a sufficient reason for supposing the hemorrhage to be due either to a simple detachment of the placenta or to rupture of some of the utero-placental vessels. To enable us to make out this diagnosis by the method of exclusion, we have next to give an account of the signs of abnormal insertion of the placenta.

HEMORRHAGE FROM ABNORMAL INSERTION OF THE PLACENTA.

The signs that announce the existence of this anomaly may be divided into the *rational* and the *sensible*. The first are derived from the mode of development of the accident, and its attendant circumstances; while the second are furnished by the touch.

When the flooding comes on at an advanced stage of the gestation, more particularly in a woman who has previously borne children, it is most generally possible to detect the presence of the placenta over the internal orifice by the touch. In this case, says Levret, there is sometimes difficulty in finding the neck, notwithstanding it be in a measure within reach of the finger; for a great quantity of coagula, a part of which is adherent, is ordinarily found in the vagina, and their detachment augments the hemorrhage; beyond all these, a soft, fleshy, and, as it were, a pulpy tumor is detected.[1] When the accoucheur examines this tumor with the extremity of his finger, it feels as if he were touching the head of a small cauliflower, and he recognizes there the anfractuosities peculiar to the external surface of the placenta; then, by searching out the circumference of the tumor, the uterine orifice, which surrounds it towards its superior part, is made out; but all attempts to pass the finger between the tumor and the orifice will prove unsuccessful without a resort to violence, and a detachment of the tumor at the point where the index is passed up; or if some one place should happen to be free, the same would not be true for the whole periphery of the cervix.

A somewhat voluminous coagulum, situated in the os uteri, might be mistaken for the after-birth; but, by a little attention, it will generally be found that the clot is much less resistant, more friable and movable than the placental mass, which latter can scarcely be changed in position, and whose parts are separated with much more difficulty. Sometimes, quite a thick layer of coagulated blood covers the external surface of the after-birth, and prevents the finger from reaching its proper tissue, though the clot can always be detached by a slight effort, and the intervals between the cotyledons be made out. Fungous or cancerous tumors of the cervix, syphilitic

[1] In general, this examination has to be made with the greatest possible care, because the separation of the clots often causes a return of the hemorrhage. Where the os uteri is not sufficiently dilated to permit the introduction of the finger without difficulty, it would be proper to wait until the discharge had continued long enough to produce its relaxation. Indeed, unless the flooding be profuse enough to render a premature labor inevitable, and unless there be an actual commencement of the labor, or the patient be very near her full term, all explorations of this kind should be suspended, and the general measures calculated to subdue the symptoms be employed instead.

vegetations, polypi, and hydatid tumors, might be mistaken for the placenta inserted upon the neck; but a consideration of the antecedents of the patient, the general symptoms she has presented, and especially a minute and attentive examination, will, I think, enable us readily to avoid mistakes of this character.

As stated above, the flooding may be dependent on an improper insertion of the placenta, and the latter be so far removed from the internal orifice that the finger, introduced into the os uteri, can only detect the naked membranes; if the patient be examined during labor, the extremity of the index should be passed over all the parts adjacent to the orifice, when the margin of the after-birth will most generally be felt, or, at least, the membranes will be found thicker than common; or, still more likely, an epichorion that is softer, and of a triple or quadruple thickness, will be detected towards that side of the os uteri where the placenta is inserted.

In certain cases, the diagnosis may be further facilitated by an examination of the lower part of the uterine tumor, even where the cervix does not permit the introduction of a finger. Thus, for instance, in a woman, used in my course for the practice of the "touch," who had advanced to the fifth month of her gestation, I observed the following condition of things: All the superior part of the excavation was occupied by a thick, fleshy, and comparatively soft tumor, which was very nearly of the consistence of the uterine walls at the second or third month of gestation. Towards whatever part of the superior strait I carried the finger, it still encountered the same resistance, and I found it impossible to detect any portion of the fœtus, or to perform the ballottement. From this single fact I suspected an insertion of the placenta over the os uteri, but was unable to verify my diagnosis; though I have since ascertained that she was delivered. six weeks subsequently, after a moderate flooding.

M. Gendrin has made a similar observation; for he says that, in cases of implantation of the after-birth over the os uteri, the only unusual phenomenon that can be recognized is the absence of the ballottement.

When the hemorrhage takes place either in a woman with her first child, or at an early stage of the gestation, when, in a word, the cervix uteri is not sufficiently dilated to permit the introduction of a finger, we might still be enabled to determine the cause of the flooding by the following signs, namely:

1. A hemorrhage caused by insertion of the placenta over the internal orifice never occurs before the end of the sixth month; and, most frequently, not until the last four or six weeks of gestation. Besides, it is highly probable that the period at which the flooding comes on, is usually subordinate to the greater or less extent of the placenta corresponding to the neck; that, in cases of insertion, centre for centre, it is manifested much sooner than where only one of its margins is in apposition with the orifice. Nevertheless, there are numerous exceptions to this (as M. Nægele considers it) nearly general rule; for, in a large number of the cases of central insertion, the hemorrhage is not developed prior to the commencement of labor.

2. It commences spontaneously, without an appreciable cause, and without any precursory phenomena; the woman being often suddenly aroused in the middle of the night by the escape of blood from the genital parts.

3. When manifested for the first time, it is generally inconsiderable in amount, and soon over; but, after having disappeared altogether, it returns, sometimes in the course of a few hours, at others, not for several days; but, at each reappearance, the discharge is a little more abundant, and lasts somewhat longer.

4. The cervix uteri (considering the period of gestation) is usually thicker, softer, and more spongy, because the placenta, by becoming fixed over this point, determines there a more considerable afflux of blood.

5. If the labor has commenced, and the membranes are still intact, the flooding constantly augments during the uterine contractions, and diminishes in the intervals. But the contrary is observed when the discharge is occasioned by a separation of the placenta attached to any other point; for then the womb, by contracting, obliterates the vessels, either by a retraction of its own proper tissue, or by the compression they are subjected to from the parts inclosed within its cavity; but, in the case under consideration, the contractions that effect the dilatation of the cervix, destroy the vascular adhesions which unite it to the placenta, more and more, and thus multiply the sources of hemorrhage. This sign is one of great value before the membranes are ruptured; but after the waters are discharged, the child's head presses on the orifice during the contraction, and prevents the blood from escaping.

6. When the insertion is complete or central, the bag of waters does not form as in an ordinary labor; for the insertion of the placenta over the neck closes its orifice, and prevents the lower segment of the ovum from engaging therein, and from being accessible to the finger. But when the placenta covers but a part of the orifice, the finger discovers a greater or less extent of membranes, one point only of the orifice being occupied with the edge of the placenta.

7. Lastly, according to Dewees, the blood has a brighter color at the onset of the hemorrhage than when it comes from the fundus, and coagula never come away, excepting when the discharge has lasted for some time, or is on the point of disappearing.

HEMORRHAGE FROM RUPTURE OF THE UMBILICAL CORD.

In the case I have reported, where the flooding was produced by a rupture of the umbilical vessels, itself caused by a separation of the chorion from the fœtal surface of the placenta, the symptoms were very similar to those which accompany a hemorrhage induced by insertion of the placenta over the os uteri. Thus, the discharge commenced towards the middle of pregnancy, was several times renewed at irregular intervals, and always in increasing abundance; and it was manifested anew at the onset of labor. The vaginal examination could alone determine the diagnosis, by enabling us to ascertain the absence of the placenta from the internal orifice.

Finally, in the case detailed by Benckiser, there was something like a cord that crossed the opening in the neck at an acute angle, and this was detected before the rupture of the membranes. This cord was devoid of pulsations, but it certainly would have exhibited them if, instead of a venous branch, it had been one of the ramifications of the umbilical arteries.

Should another case of the kind be met with, the presence of such a vascular trunk on the membranes ought to receive attention, and arouse a suspicion of the possibility of a hemorrhage from its rupture.

B. *Internal Discharge.*—The diagnosis of the internal hemorrhages becomes more easy as the gestation advances. The general phenomena that accompany all profuse discharges would first attract attention; while the unusual and rapid development of the abdomen, and occasionally its irregular form, would confirm the surmise. The hemorrhage can always be recognized whenever it is abundant enough to endanger the mother; though it must be acknowledged that a quantity of blood may be effused between the womb and the placenta, which may effect nearly an entire separation of the latter, or destroy the child, without giving rise to any other phenomena than a manifestation of labor. Internal hemorrhage is especially to be feared after the membranes are ruptured, because then the blood may escape in large amount into the cavity of the ovum, or press the membranes aside with the greatest facility. In this case, the danger will be indicated by the general symptoms, and the diagnosis confirmed if the uterus, which had contracted firmly after the discharge of the waters, is now found to have attained a size equal to or greater than its original volume.

A considerable enlargement of the belly is a sign of the first importance; but it must not be forgotten that this may be occasioned by an entirely different cause. Thus, for instance, a tympanitis of the abdomen or a dropsy of the amnion may give rise to it; however, the sonorousness in the former case, and the slowness of the development of the abdomen in the latter, conjoined with the absence of any general phenomena, will always prove sufficient to avoid an error. Again, the patient may be affected with a syncope during the labor that is wholly foreign to any discharge of blood; but then the size of the abdomen will not increase.

On the whole, therefore, the general phenomena that accompany all losses of blood, and a rapid enlargement of the belly, are the two characteristic signs of internal hemorrhage, whether it occurs in the latter stages of pregnancy or during the parturition.

Finally, internal hemorrhage during labor is frequently followed by weakening or even suspension of the pains. The abdomen sometimes becomes painful, (Levret,) and in some cases an obscure fluctuation can be detected, (Leroux.)

Nevertheless, M. Henning has observed that, under certain circumstances, the abdominal swelling may be altogether wanting, and yet the syncope be dependent on an internal discharge. Thus, he says, the patient is taken at first with violent uterine pains, that reappear at certain intervals, and each one of which is followed by a slight issue of blood from the vulva; then, at a moment when least expected, the symptoms of a most alarming syncope come on, though but little blood can be found upon the cloths, and the uterus is scarcely distended. But, by making a careful examination, the accoucheur will find, that although this organ may inclose but an inconsiderable coagulum, and although the blood does not escape freely to the exterior, yet it is because the vagina is distended by an enormous clot as large as a child's head. I deem it necessary, he adds, to insist on the presence of

uterine pains, in these cases of *intra-vaginal* hemorrhage; for they are generally regarded as an evidence that nothing is to be feared from the discharge, whilst, in reality, they are often a distinctive character of the hemorrhage in question.

ARTICLE IV

PROGNOSIS OF EXTERNAL AND INTERNAL HEMORRHAGE.

As a general rule, the prognosis of uterine hemorrhage is unfavorable; though, perhaps, in a single instance, the discharge occurring in a pregnant female may prove advantageous—it is where the patient is harassed by all the symptoms of a general or local plethora, and a moderate discharge takes place that relieves her of the surplus that gave rise to all these symptoms. But as we cannot always moderate a flooding at will that has already commenced, it would be better both to relieve the patient and to prevent the menorrhagia by resorting to venesection.

The gravity of the prognosis depends very much on the amount and rapidity of the discharge, and the period at which it takes place, being always so much the more dangerous both for the mother and child as the blood escapes in larger quantities. Other things being equal, the infant's existence will be more seriously compromised when the flooding comes on at an early stage of gestation; as regards the mother, it is generally much more serious at an advanced period; yet it is well to observe that the danger is greater in the seventh and eighth months than toward the end of the ninth. Thus, of 137 cases of hemorrhage occurring in the seventh and eighth month, 38 were fatal; whilst, of 78 occurring in the course of the ninth month, 10 only were fatal. This difference is certainly due to the slowness with which the neck dilates in the earlier months.

During childbirth, this accident will be more serious both for the mother and child when it is manifested at an early stage of the process; and it will be still more dangerous in a primiparous woman than in one who has previously borne children. For it must be evident that, if the flooding should occur at the commencement of labor, that is, long before the dilatation of the os uteri is effected, and before the external parts of generation are suitably prepared for the free and easy passage of the fœtus, the means adequate to and calculated for, the termination of the labor will be of much more difficult application, and more delayed; and, consequently, a larger quantity of blood might escape.

Finally, the risk is also modified by the powers of endurance of different patients; the loss of a given amount of blood may be of small moment to a very vigorous woman, but very dangerous to a weak one.

Internal hemorrhage is generally more dangerous than the external, because it often takes place imperceptibly in the commencement of gestation, and thus destroys the fœtus; while, at a more advanced period, it compromises the mother's life, before having given rise to any symptom whereby its existence could be positively recognized, so that the accident is often detected too late to be remedied.

When the blood collects in the uterine cavity, the accumulation cannot take place without detaching a new portion of the placenta, and this secon-

dary separation becomes a fresh cause of vascular rupture, and, as a consequence, augments the chances of flooding. For even suppose the hemorrhage were arrested, whether spontaneously or under the influence of the measures employed, there does not the less remain a voluminous coagulum in the uterus, a veritable foreign body, whose presence will irritate its walls, will determine there a more considerable sanguineous fluxion, and will excite premature contractions, and thus become perhaps the cause of another discharge.

Lastly, during the parturition, the internal hemorrhage is less to be feared before than after the membranes are ruptured; because, in the former case, the womb, being already occupied by the amniotic liquid, will yield less readily to a new distention, and, consequently, will prevent a great effusion of blood. Besides this, the integrity of the membranes will admit of their artificial rupture, which, by the salutary retraction that follows it, is one of the most valuable resources of our art in these unfortunate cases; and of which, it is unnecessary to add, we are deprived when the waters escape prematurely.

But the dangers that threaten the woman while the hemorrhage lasts are not the only ones to be dreaded; for her constitution and health may be broken down for a long time by these grave accidents. The labor is generally tedious, the pains being short and distant, and inertia of the uterus a consequence of the general weakness. After delivery, when all hemorrhage has ceased, some women are so completely exhausted as to have frequent attacks of fainting. Whatever solid or fluid nourishment is taken into the stomach is rejected, and they often die a few hours or days after the termination of labor. Even when the patients have the good fortune to escape with their lives, they ordinarily suffer for a considerable period; they are tormented with constant pains in the head; their digestion is painful, their vision and hearing are defective;[1] and there are often wandering pains in the limbs, trembling, &c., &c. Most frequently the labor is lingering, the pains are short and distant, and inertia of the uterus results from this general weakness. Those females who have been afflicted with profuse hemorrhages are far more disposed than others, during the lying-in, to acute inflammations, and to peritonitis especially; which inflammations then advance more rapidly to a fatal termination, because the general condition of the patient does not permit an active resort to the antiphlogistic treatment.

The cephalalgia noticed by all observers, and which I have frequently had opportunities of verifying myself, only disappears after a very long time, and not until the reparation of the blood and the reestablishment of the strength have taken place. M. Baudelocque supposes that the pain is particularly apt to be seated in the hinder part of the head. Leroux attributes this affection to a diminution in the quantity of blood contained in the vessels of the brain, which occurs as an immediate consequence. I would rather explain it like Baudelocque, by the direct influence which the loss of blood must exercise over the nervous system.

[1] In a case reported by Dr. [illegible] the patient became entirely [illegible] she could not distinguish anything at all, and was right well pleased [illegible] six months afterward.

The child's death does not necessarily result from the hemorrhage fo., when the latter is inconsiderable, the gestation continues its regular course. The loss of blood has even been carried to an extent calculated to inspire just fears for the mother's life, and yet without being followed by abortion.

But although the fœtus may have resisted the violence of the first accidents, it must not be supposed that it experiences no injurious effects therefrom. Though but a small portion of the placenta may have been separated, the fœtus is nevertheless deprived thereby of a portion of its means of respiration and of nutrition, and this deprivation, though partial, may eventually prevent its complete development, and even destroy it before the termination of pregnancy. Therefore, when born alive, it is often emaciated, and weaker than under ordinary circumstances; and this congenital debility, which is generally regarded by authors as a consequence of the anemic condition of the mother, should, in my opinion, be attributed to the partial separation of the placenta.

When the mother has had the good fortune to escape the danger that menaced her, and the pregnancy continues, how then is the hemorrhage arrested? The mode of termination varies somewhat, according to the cause that has determined the accident. Thus, when the flooding has been preceded by general plethora, or by uterine congestion, it may happen that the escape of blood removes this condition, and thus remedies the symptoms itself; and this must nearly always be the case where the discharge resulted from a sanguineous exhalation. But where there is a rupture of one of the utero-placental vessels, it is possible that the flow of blood, by relieving their distention, will permit these vessels to become flattened down and depressed, from the double pressure of the ovum and womb, and then the hemorrhage is arrested. Again, where the placenta has been detached from the womb to a moderate extent, the bleeding can only be checked by the formation of a coagulum, which creates an obstacle to the ulterior issue of the blood, by being placed between the uterus and the placenta; for, "while the blood is endeavoring to glide towards the os uteri," says M. Velpeau, "a more or less extensive portion of the placental mass becomes fully saturated with it: first one clot forms, then a second, then a third, and these several layers, of various thickness, soon become sufficiently numerous, provided the energy of the hemorrhagic affluxion becomes diminished, to exert such a degree of pressure as to retain the blood within its own vessels." All the vascular tubes corresponding to the point where this coagulum is formed, are thenceforth rendered useless to the utero-placental circulation, which can only be kept up through those that have not been lacerated.

The authors of the *Dictionnaire de Médecine* (art. Hemorragie Uterine) seem to admit, from a case reported by Noortwyk, that the detached portion of placenta may contract new adhesions with the uterine wall; but from what has just been said respecting the formation of the coagulum, which, by its presence, puts an end to the symptoms, it is impossible to admit that this re-attachment can take place without the intervention of a fibrinous clot, which evidently precludes the re-establishment of the circulatory relations. Besides, this matter is satisfactorily proved at the time of labor; for, by examining the uterine surface of the placenta, we can then detect one or

more fibrinous laminæ of a variable size, and differing from each other in the degree of degeneration, according to the period at which the separation was effected; in addition to which, the portion of placenta that had been detached is often atrophied and deprived of juices; in a word, the corresponding placental cotyledons have withered away completely.

PROGNOSIS OF HEMORRHAGE CAUSED BY ABNORMAL INSERTION OF THE PLACENTA.

As regards the cause producing the hemorrhage, that variety which is dependent on an implantation of the placenta over the inferior segment is the gravest of all: to the mother, because it is renewed several times during the latter months of her gestation in a constantly increasing amount, and because, being always present during the labor, it usually requires the intervention of art; to the child, because such an intervention is not without danger to it, and the interruption of the utero-placental circulation, resulting from the detachment of the placenta, produces an asphyxia that oftentimes proves speedily fatal. The fœtus then dies by asphyxia, and not by hemorrhage, as has been asserted. For the fœtus can only lose its blood when the source of the hemorrhage is in a lesion of the umbilical vessels; while, in a case of simple detachment of the uterine surface of the placenta, the child dies only because the circulation is interrupted in the utero-placental vessels, and its respiration can no longer take place. (See *Functions of the Fœtus.*) The blood, being shut up in the umbilical vessels, cannot come any more into the usual mediate contact with the maternal blood, and the infant is then in the same condition as an adult deprived of respirable air, and like him must die asphyxiated. Besides, the autopsical examination in such cases exhibits the anatomo-pathological characters of asphyxia. The following statistics, by Dr. Simpson, prove the danger of this complication, namely: of 399 women in whom this misplaced insertion of the placenta was observed, 134 perished.

According to Lusk, one mother in four dies during or shortly after delivery, and nearly two out of three of the children are born dead. More than one-half of those born living die within the first ten days. The maternal mortality is twice as great in placenta previa centralis as in placenta previa lateralis. Out of 64 cases recorded by Barnes, the deaths were six, or one in ten and a half.

When the placenta is inserted over the neck, centre for centre, the hemorrhage would evidently be much more profuse than in the cases in which it is in contact with the orifice by one part of its circumference only.

That as the ovum can then yield only with great difficulty, because of the strength of that part of the chorion which bears the umbilical vessels, the labor is greatly prolonged, the fruitless contractions weaken at last, and the hemorrhage is increased by inertia of the womb.

A singular circumstance sometimes takes place in cases of central insertion. The gradual dilatation of the cervix may effect the complete detachment of the placenta, which may, perhaps, be entirely expelled through the vulva several hours before the expulsion of the child. This accident, which, at first view, would seem likely to have the most disastrous consequences, is

nevertheless proved by experience rarely to compromise the mother's life though it is generally fatal to the child.[1]

In some rare cases it has happened that the head, under the influence of powerful contractions, perforated the centre of the placenta, and was expelled through the passage thus formed. Portal's twenty-ninth observation relates to a case of this kind; and W. White informs us that in an instance of apparently central insertion upon the neck, the woman had two or three very strong pains, during which the head perforated the placenta, and was expelled. The child was still-born, but the mother recovered. In an autopsy made by Dr. Ingleby of a woman who died of hemorrhage just as the child

[1] Chapman relates an instance in which the after-birth was thus expelled four hours in advance of the child; and Perfect furnishes a very similar case. (*Cases*, vol. ii. page 288.)

"I was once consulted," says Merriman, "by a very careful and judicious practitioner, respecting a woman, who, when I first saw her, was rapidly sinking under puerperal fever. In this case, the placenta was expelled many hours before the child was born, and no extraordinary means were used to expedite the delivery of the child; a physician-accoucheur, who was consulted on the occasion, having deemed it more prudent to leave the case to nature. The fatal event, however, would lead one to doubt whether it was wise, under such circumstances, to decline the interference of art." (*Synopsis*, page 126.)

Smellie has reported three cases of the same kind; Lamotte, three (*Obs.*, 321, 322, 323); Lee, three (*Med. Gaz.*, 1839); Ramsbotham, Sen., five (*Practical Obs.*, Case 153); Baudelocque and Barlow, each one; and Dr. Collins (*Practical Treatise*, page 91) narrates an instance in which the placenta was expelled about eighteen hours before the fœtus; the membranes were ruptured, and the waters escaped two weeks before the entrance of the patient into the hospital; from that time until the eve of her admission, the flooding had continued with more or less abundance. We satisfied ourselves, says he, that the placenta had been extracted the evening before by the midwife who attended her. This woman recovered perfectly, and left the hospital on the thirteenth day.

Cases of this kind are much more common than might be supposed; thus, Dr. Simpson has collected 141 authentic observations, and, in order the better to appreciate the effect of this premature separation, he has divided them into four categories. In the first, 47 in number, there were 41 still-born children, and 10 of whose condition nothing could be learned, but all the women except three recovered. In all, the hemorrhage diminished greatly, or ceased altogether, immediately after the expulsion of the placenta, although an interval of ten hours at the most, and of ten minutes at the least, had elapsed between the expulsion of the after-birth and the birth of the child. In the second are placed 24 cases. In all of these rather less than ten minutes intervened between the expulsion of the placenta and that of the fœtus; 9 of the children were still-born, 2 were putrefied, and 11 were alive; no information respecting the two others; all the mothers but three recovered. The third contains 29 observations, in which the expulsion of the child followed that of the after-birth immediately; 14 still-born, and 11 living children; no information respecting the others; all the mothers recovered, except one. Finally, in 10 cases, the time between the birth of the child and the delivery of the placenta was not noted. Only 3 mothers died, and 9 children survived.

Thus, according to these facts, the premature separation of the placenta, which does not appear to have had a very serious effect upon the mothers, is extremely dangerous to the child, since all the children of the first series died; half only of the second, and eleven of the third category, survived.

We shall refer to these figures hereafter, in order to appreciate the practical consequences which Dr. Simpson thinks himself able to deduce from them.

was about being born, he found the head in the vagina, having passed through a central perforation of the placenta.

When the placenta is situated only in the vicinity of the neck, the hemorrhage may not appear during the labor, although it may have occurred several times in the latter stages of pregnancy; for, should the membranes rupture prematurely, and the head be presenting, it is possible that its engagement might compress the torn vessels sufficiently to prevent the discharge of blood [1]

ARTICLE V.

TREATMENT.

The management of uterine hemorrhage may be subdivided into the preventive and curative treatment. The prophylactic measures are as numerous as the predisposing causes, and they consist in preventing the action of those causes; hence, to furnish a detailed account of them, it would be necessary to enter into a series of repetitions. Besides, they are included in the hygienic and general therapeutic management of pregnancy, and, therefore, we need not dwell further upon them here. But if, notwithstanding all the preventive means employed, or if, from the influence of any unforeseen causes, a hemorrhage is developed, what course shall we adopt to subdue it? The frequency of this accident, and its great danger in many cases, have at all times claimed the attention of practitioners; and with a view of facilitating the study of the numerous measures that have been recommended, we shall divide them into the general and the special ones. The first being applicable in all cases, are nearly always the same; but the second vary according to whether the flooding takes place in the course of the gestation or during parturition, and according to the abundance or the trifling character of the discharge.

[The measures taken to arrest hemorrhage ought not to be used indiscriminately, because each has a special mode of action which should be well understood before having recourse to it. Thus, bleeding and general remedies such as acidulated drinks, absolute rest and reduction of temperature, are intended to lessen the activity of the general circulation and, as sedatives, are useful in uterine as well as other forms of hemorrhage. Cold applications to the hypogastrium and thighs, cold injections and raising the breech by a cushion are, on the contrary, addressed directly to the uterine circulation which they are capable of reducing. Ergot, which has an excellent effect, may be used with a double purpose: some authors believing that it acts as a true specific, in virtue of a power of altering the character of the blood or of exciting the contractility of the vessels, whilst others think that it arrests hemorrhage only by producing contraction of the uterus, the effect of which we know is to lessen the circulation in the organ. Rupture of the membranes, by giving issue to the amniotic fluid, causes the walls of the womb to contract, and in so doing constrict and lessen the calibre of the vessels which they contain, thus becomes a very valuable means of checking hemorrhage. We have

[1] When, says Plenck, the orifice is half covered by the adherent placenta, the case should be left to nature; for the head of the child pushes the presenting part of the placenta aside, compresses the blood-vessels, and thus prevents hemorrhage. This precept, though too absolute, at least proves that Plenck had made the same observation that we have just mentioned.

already stated in regard to the treatment of abortion (see *Abortion*), that injections of laudanum are capable of arresting the contraction of the womb, and may therefore be very serviceable whenever the loss of blood is due to irregular contractions. Lastly, the tampon is a plug which arrests the discharge of the blood and allows the progressive formation of a clot which finally obliterates the torn vessels.

Each of the above-mentioned measures has its special application according to the object in view, and ought not, therefore, to be used without judgment. What has been said will, I think, be sufficient to indicate the course to be pursued, and simplify the account of the details of treatment which we are anxious to present in the fullest manner.]

§ 1. General Therapeutic Measures.

Whenever an accoucheur is summoned to a pregnant woman who is affected with flooding, he should immediately attend to certain precautions that we are about to point out, namely:

The woman ought to be kept in a horizontal position, care being taken to have the pelvis elevated somewhat higher than the rest of the body. All feather beds must be proscribed, and, whenever possible, she should lie on a hair mattress that is rather hard. The bed is to be placed in a large, well-ventilated chamber, so as to be easily accessible on all sides; in the summer season, the room might even be sprinkled; and the woman is to be lightly covered. It is desirable to have the chamber somewhat darkened, and the attendants should be advised to discharge their respective duties without making any unnecessary noise. He should endeavor to satisfy the patient as to her condition, and to remove all sources of vexation and opposition; for calmness of mind is not less essential than rest of the body; especially, when the discharge has been occasioned by violent passions or acute moral affections.

Cold drinks, slightly acidulated with vinegar, gooseberry, or lemon syrup, or even with lime or orange juice, are the most suitable. We should endeavor to obviate the strainings the patient might make on the close stool, because they might possibly increase the flooding; for this purpose, the bowels are to be kept free by injections, or, if these are not sufficient to remedy the constipation, by mild laxatives; and, lastly, if the woman has the least difficulty in urinating, it would likewise be necessary to empty the bladder by the catheter.

§ 2. Special Therapeutic Measures.

These vary, as stated, according to the abundance or trifling character of the discharge, and according to whether the latter is manifested in the course of the gestation, or during the labor. We shall first examine them during pregnancy.

A. *Moderate Hemorrhage, occurring in the last three months.*—If the flooding has been preceded by the general phenomena of plethora, and if at the time when the woman is examined the pulse be found full, strong, and developed, the face flushed, &c., in a word, if the hemorrhage appears to be owing to, or kept up by, the plentitude or morbid action of the vessels, it is necessary to have recourse to general venesection, which will act both as a revulsive and as an antiphlogistic; but this measure is recommended in those

cases only in which labor has not yet commenced, and where the discharge is inconsiderable, and has lasted but a short time. Blood-letting must be proscribed under the opposite circumstances, as also in those instances where the flooding is not associated with plethora.

When the hemorrhage is not very abundant, and, as a consequence, when there is some reason to hope that the pregnancy will continue on its regular course, opiates may be administered; they might be given by the mouth, but it is much better, in general, to exhibit them by injection, in the dose of twenty drops of Sydenham's laudanum, diffused in a small quantity of some mucilaginous vehicle; and this may be repeated three or four times, at intervals of an hour or more, where the first have not been sufficient to arrest the symptoms. A long experience, says Burns, enables me to recommend this measure in all cases where blood-letting is not practicable. For the first twenty-four hours, the patient must be subjected to a strict regimen.

Such are the measures to be employed in cases of moderate hemorrhage occurring in the last three months of gestation; and they should be continued until it has entirely disappeared.

After the symptoms are wholly subdued, the woman ought to take the greatest precautions to avoid a relapse, by keeping in bed for a week at least, eating but little, and that of non-succulent articles, especially if the discharge had been attributed to plethora, &c., &c.

B. *Profuse Hemorrhage occurring in the last three months.*—Where the flooding is more abundant, the remedies to be employed are also more active, and, to the measures already enumerated, except venesection, which, as before stated, must be rejected when the discharge is very profuse, we may now add:

1. The application of compresses, steeped in some very cold liquid, to the upper part of the thighs, hypogastrium, or loins (in one instance, M. Gendrin successfully administered an opiate injection at the temperature of melting ice); and, where the heat is very great, cold sponging over the legs, arms, and even the body. But the action of cold is not to be resorted to without discrimination; nor, as a general rule, should it be kept up for a long time; because, although its application may be useful at the commencement of the attack, when the phenomena of local congestion are manifest, it would certainly prove injurious if a very copious and persistent flooding had already enfeebled the patient, and if there was reason to fear the powers of life were giving way, and that the woman was likely to sink into a state of complete prostration.

When the skin is cold and the pulse small and feeble, the refrigerants are not indicated, and they should be suspended at once, if already in use.

2. In this latter case, if the flooding continued and the prostration augmented, it would be necessary to have recourse to revulsives applied to the superior parts. I have seen, says M. Baudelocque, a profuse hemorrhage suspended almost instantaneously by placing the hands in very hot water.

Under the title of revulsives it has been recommended, since the days of Hippocrates, to apply cups either above or just under the breasts, and between the shoulders.

M. Velpeau advises the employment of a sinapism at the upper part of

the back; for he has found this remedy beneficial in a great number of instances, and at all stages of gestation; "nevertheless," he says himself, "there would be little wisdom in relying upon it to completely suppress a hemorrhage that had already become serious and alarming." It is, however, an auxiliary measure that should never be neglected, for it can have no disastrous tendency; but, in my opinion, the same cannot be said of revulsives applied to the breasts, since it is by no means certain that they may not prove injurious. Indeed, many authors, relying on the sympathy existing between the uterus and the mammæ, have supposed that every stimulant applied to the latter must excite the action of the former, and, consequently, tend to renew, or to keep up, the hemorrhage.

3. If the measures hitherto enumerated be not sufficient to arrest the flooding, the ergot might be exhibited in the dose of half a drachm divided into three parts, one of which is to be taken every ten minutes. This medicine, which is recommended by M. P. Dubois under such circumstances, appears to him to have nothing more than a hemostatic action; "for, if it be objected," says he, "that this remedy might excite uterine contractions, and thus provoke a premature labor, we answer that, up to the present time, not a single well-founded observation proves that the spurred rye has the property of *provoking* the uterine contractions; though, where these exist already, it increases them, or restores them when suspended; but it does not cause them to appear if the uterus is in a state of perfect rest. On the other hand, even supposing that it had this virtue, that would not be a just ground of exclusion, for it must not be forgotten that the question is before us of arresting a serious accident, one which cannot continue without prejudice to both mother and child; and that the only other resource is the use of the tampon, which even more than the ergot would expose her to the hazard of a delivery before term." (*Journ. de Méd. et de Chir. Pratique*, 1836.)

4. But it sometimes happens that, notwithstanding the employment of refrigerants and ergot, the flooding continues, the woman becomes pale and colorless, the pulse small and thread-like, and she has vertigo, &c.; and the violence of the symptoms endangers the lives of both mother and child. Under these grave conditions, the accoucheur has only to choose between an application of the tampon and a provocation of the labor by rupturing the membranes.

A. *Use of the Tampon.*—When speaking of the natural termination of those hemorrhages that come on during pregnancy, we stated that the discharge was arrested in consequence of the formation of coagula, which, by becoming applied over the orifices of the vessels, perhaps even by being continued into these orifices, prevented a subsequent discharge of blood; and that it is on the formation of these salutary coagula that we must found our hope, so long as there is a chance of preserving the infant. It was with this view that the older physicians resorted to the use of astringent injections, and more especially to pessaries made of some old linen saturated with such liquids. But they did not depend upon the coagulating and astringent properties of these substances alone; but also relied on their mechanical effect in retaining the blood. For this purpose, therefore, Leroux, of Dijon, proposed his tampon in 1776. This remedy, says he, is exceed-

ingly simple; it consists in the creation of an obstacle to the escape of the blood by filling up the vagina with balls of linen or tow, saturated with pure vinegar. Desormeaux thought it was better to first double a large piece of fine linen, and then carry up the fold to the fundus of the vagina; and afterwards to fill the pocket thus formed by the linen with bits of charpie, or tow, or any other soft substance that may be at hand. M. Moreau condemns this procedure, because, he remarks, it is difficult and painful, and it would be almost impossible not to leave some space between the tampon and the cervix uteri. He recommends the mode of application to be altered to suit the particular case: for instance, if the os uteri is a little dilated, he advises the use of a roller, wound tightly in the form of a cone, and well fastened; then the conical extremity of this plug is introduced into the uterine orifice itself, and is retained there by the finger. When the dilatation is somewhat more advanced, he makes use of a lemon, having the rind pared off at one extremity, and he introduces this into the neck of the womb, where its bulk obliterates the orifice, and its juice irritates the organ; and lastly, when the os uteri is freely dilated, he recommends the vagina to be crammed with lint steeped in vinegar, and the whole to be secured with a T bandage. Leroux was also in the habit of saturating the tampon with vinegar. The astringents were considered useless by Desormeaux; for, he says, it is only on the mechanical action of the tampon that we can rely, and not upon the irritation which its contact, and that of the acids with which some persons saturate it, may have on the uterine wall. It would be very fortunate, indeed, if the only effect of the tampon was to prevent the issue of the blood, and to determine its coagulation; for then, by arresting the hemorrhage, we might preserve the life of the fœtus much oftener than is now done. But, unhappily, it has yet another effect; that is, it frequently irritates the organ by mere presence, and by forcing the blood to coagulate in the uterine cavity, whereby a more or less voluminous coagulum is formed there, which further adds to the irritation produced by the tampon itself; contractions are excited, and, in most cases, the womb soon drives out the tampon, coagulated blood, and fœtus altogether. This, we may observe in passing, is the most serious objection that can be urged against the use of the tampon, a reproach that it often merits, especially when it is saturated with vinegar.

But, after all, notwithstanding these disadvantages, the tampon is a remedy that cannot be dispensed with in practice; and we do not know how to better describe the cases in which it may be resorted to with advantage, than by furnishing the following extract from the memoir published by Gardien, in the ninth volume of Leroux, Boyer, and Corvisart's Journal.

The tampon may be applied: 1. To arrest any hemorrhage that might arise from the rupture of a varix on the uterine neck, or in the vagina. 2. In a case of laceration occurring at the orifice of the womb during labor, and when there is any inertia, by a direct application to the torn surface. 3. In cases where the placenta is inserted over the os uteri centre for centre; the blood being retained by the tampon, forms a coagulum which is compressed between it and the after-birth, whereby the serous part is expressed, and a concretion takes place which contracts adhesions with the adjacent

parts, and suspends the discharge until the rupture of some other vessel renews the hemorrhage. Nothing is to be feared in these cases from an internal bleeding; for, although we have quoted some examples of the kind, these are so rare that they cannot counterbalance all the advantages of the tampon; besides, the mere fact of its employment does not dispense with the necessity of carefully watching the patient. 4. It is likewise serviceable in the floodings attending the abortions which take place in the course of the first three months, whether before or after the delivery of the after-birth: before, because Puzos' method might render this delivery impossible, or at least very difficult; and after, because there would be no cause to fear an internal hemorrhage, for the reasons before given. 5. It might answer in those instances where there is no dilatation of the os uteri, or when this is impossible, and consequently where it would be impracticable to pierce the membranes. 6. And lastly, where the flooding continues after the membranes have been punctured, and it is impossible to effect a forced delivery; as in the cases reported by Lamotte and Smellie. Nevertheless, its employment then should always be watched over with the greatest possible attention; for the uterus, in which a void is created after the discharge of the waters, is susceptible of becoming distended, and an internal hemorrhage might take place. Under such circumstances, artificial delivery must be resorted to.

But the tampon should be rejected: 1. Whenever we might reasonably hope to prevent an abortion; for even Leroux himself made use of the ordinary means before resorting to this measure; because, by retaining within the womb the blood that would otherwise escape, it distends this organ by forming a coagulum, which may increase the detachment of the membranes and placenta, and may likewise irritate the womb by its presence, and thus bring on the contractions; and 2. Whenever (as hitherto stated) the placenta is inserted over the os uteri, and the labor is sufficiently advanced for turning or the forceps to be resorted to.

B. *Rupture of the Membranes.*—When the hemorrhage is profuse, and has made its appearance during the latter months of gestation, more especially if the labor has already begun, a rupture of the membranes should generally be preferred to the use of the tampon. The child's life is then almost as precious as the mother's, and we must endeavor to remove it from the threatened danger. It was with this view that our predecessors resorted to an artificial labor under such circumstances. But Puzos has proposed a measure which conjoins the advantages of the natural with those of a forced delivery. It is necessary for this purpose, he says, to introduce one or more fingers into the uterine orifice, by which an attempt is made to dilate it with a degree of force proportioned to its resistance; this gradual dilatation, which is interrupted by intervals of rest from time to time, excites the pains: the womb contracts, and during its contraction the membranes become tense, and engage a little at the upper part of the cervix, and these latter are ruptured as soon as possible, in order to effect a discharge of the waters. The presenting part, particularly if this happens to be the head, should be carefully pressed up by the finger for some moments, so as to permit the liquid to escape. The objects to be accomplished are obviously to

encourage a discharge of the waters, to arouse the contractility of the uterine tissue by their evacuation, and to solicit its retraction; whereby the vessels situated in the thickness of its walls would undergo certain modifications favorable to an arrest of the hemorrhage. Further, when the womb is well contracted on the body of the child, and some portions of the latter are forcibly applied against the patulous vessels that furnish the blood, the compression thereby produced must evidently arrest the flooding.

This method, which has been adopted by Dr. Rigby, of England, has been severely criticised by his countryman, Duncan Steward, who endeavors to support his own opinion by the following observations: by rupturing the membranes before the uterus is dilated, we retard rather than accelerate the expulsion of the child; and, besides, it is by no means certain, as experience has demonstrated, that this measure will arrest the hemorrhage; while it often diminishes the chance of saving the life of the mother and child, by rendering the version much more difficult, if this operation should subsequently become necessary.

Notwithstanding these objections, which, after all, have no great force, the rupture of the membranes is advocated by most of the teachers of the present day, in cases of profuse flooding, occurring at an advanced stage of gestation. Nearly all teach, however, that a regular commencement of labor, manifested by evident uterine contractions, should precede its performance; but, as M. P. Dubois remarks, it is important to bear in mind that, when a considerable hemorrhage takes place, the contractions of the womb are often feeble, and that the labor may actually be progressing, though the pains have not clearly marked its onset; while, on the other hand, the discharge of a large quantity of blood and the escape of voluminous coagula, both relax and dilate the uterine orifice; and these circumstances, which are doubtless joined to some non-painful contractions, may dilate the os uteri, without the knowledge of the patient or the suspicion of the accoucheur. This phenomenon is not at all unusual, especially in women who have previously borne children; and, therefore, whatever be the condition of the body of the uterus, and whether there be any apparent contractions or not, he should carefully ascertain the state of the os uteri. In cases of profuse flooding, this will most frequently be found sufficiently dilated to permit the introduction of a finger, at least; and the membranes will then be felt tense and protruding at intervals; which protrusion is a certain proof that the womb begins to contract, and the rupture of the membranes will then be effected to the greatest advantage. Besides, this operation does not exclude the employment of the various stimulants calculated to excite the contractions; thus abdominal frictions might be resorted to, and the finger, when introduced into the neck, should first titillate and irritate this part before making the rupture; and it would even be prudent to administer two or three doses of ergot to the patient, provided the neck is softened, and it seems to offer no marked resistance to the dilatation.

Most accoucheurs advise the application of the tampon, when the discharge is produced by an insertion of the placenta over the cervix; but M. P. Dubois teaches that the course to be pursued in such cases will vary accord

ing to the degree of this insertion. For instance, where it takes place centre for centre, or in other words, when the placenta covers all the superior part of the internal orifice, and the membranes are inaccessible, or can only be reached by detaching some portion of the circumference of the still adherent placenta, we should have recourse to the tampon: but where the placenta corresponds to the orifice by only one of its borders, and particularly where it is inserted at some point adjacent to this orifice, he likewise recommends an artificial rupture of the membranes; being satisfied that, after the waters have escaped, the child's head, by becoming applied on the detached portion of the placenta, will, by compressing it, put an end to the flow of blood.

Quite recently, M. Gendrin has entertained the idea of adopting Puzos' method, even in those cases in which the after-birth corresponds to the os uteri centre for centre. Under almost identical circumstances, Rigby had deemed it advisable to push his finger through the centre of the placenta, and thus pass directly into the amniotic cavity. The following are the observations of M. Gendrin on this subject: Authors, he says, have advised that labor should be induced by direct manipulations, which consist in forcing the dilatation of the os uteri and passing into the womb through the placenta, or by detaching this organ from one portion of the neck; but these manœuvres occupy much time, and besides are very difficult, and if the blood continues to flow, the enfeebled patient may become prostrated. We propose instead the following process, which has the great advantage of keeping up the relation between the after-birth and the uterus, as long as possible. It consists in evacuating the waters, by making a puncture with a female catheter, which is directed along the finger previously introduced into the os uteri, and is passed into the membranes through that portion of the placenta lying over the neck. In the two cases in which he adopted this plan, the hemorrhage disappeared immediately; and this measure may, therefore, be employed, when the amount of the discharge indicates a resort to the method of Puzos, and when the presence of the placenta is the only obstacle.

We think, however, that if the dilatation is but slight, the tampon had better be applied.

Internal Hemorrhage.—We can only expect to overcome those internal discharges that are serious enough to compromise the mother's life, by emptying the womb and terminating the labor. Two different conditions may then be met with, viz., one, in which the labor has not yet commenced, the neck is still undilated, and its margins hard and thick; in the other, on the contrary, there are some labor-pains, the cervix is softened, and is more or less dilated. In the latter case, the indications for treatment are obvious; that is, to rupture the membranes and employ all the various measures which are calculated to hasten the contractions (such as abdominal frictions, titillations of the orifice, and ergot), and to watch the state of the womb after this rupture attentively. Such is the course to be pursued when the dilatation is inconsiderable; but, on the other hand, when the os uteri is either dilated or dilatable, the delivery should be effected at once by turning, or by an application of the forceps, according to circumstances. (See *Version*, and art. *Forceps.*) But where the symptoms occur a short time before the full

term of gestation, particularly in a woman with her first child, the complete obliteration of the cervix may constitute an insurmountable obstacle to the introduction of the smallest instrument. In these grave cases, after having employed the usual means to moderate the effusion of blood without benefit, such as irritations made on the neck and over the fundus of the womb, with a view of bringing on its contractions, it will be absolutely necessary to perforate the membranes, and if the hemorrhage continues, and the woman becomes weaker and weaker, and is threatened with death, to have recourse to a forced introduction of the hand. Generally speaking, the slightest efforts will be sufficient to overcome the resistance; since it is scarcely possible for a considerable effusion of blood to take place in the cavity of the uterus, without causing a development of some pains, or at least a marked diminution in the resistance of the cervix. But if it should unfortunately happen that this resistance cannot be surmounted, I think that multiple incisions ought to be made on the neck itself. If the symptoms were not very urgent, it would be better perhaps to have recourse to compression of the abdomen, which would prevent the womb from becoming inordinately distended. This procedure has so often appeared successful, that its employment under like circumstances would be justifiable.

c. *Moderate Hemorrhage during Labor.*—When the flooding occurs during labor, the indications it presents likewise vary according to the intensity of the symptoms and the degree of dilatation of the os uteri. When the blood escapes in small quantities, and the accoucheur is satisfied that it does not accumulate within the organ, he will employ here the same means as were recommended for the slight hemorrhages occurring in the latter stages of gestation; except the blood-letting, which should only be practised when evident phenomena of plethora exist, and also excepting the opium, which would here be attended with the serious inconvenience of suspending the uterine contractions. These general measures will usually prove sufficient when the neck is but little dilated, and the discharge is inconsiderable.

But should the cervix be freely opened, or be so softened as to offer no resistance, we should rupture the membranes, if they are yet intact; and if the flooding still continued after this rupture, the labor lingered, and the pains though at first energetic, became gradually feeble, and the intervals between them longer, they should be aroused by the administration of ergot.

d. *Profuse Hemorrhage during Labor.*—Whether the hemorrhage be internal or external at the time of labor, it always offers the same indications for treatment; and these latter are also based on the variable degree of dilatation of the neck of the uterus. For, if this is but little advanced, that is, if the cervix be neither dilated nor dilatable, the remedies we have advised for the profuse hemorrhages occurring in the latter months of pregnancy should again be brought into service; that is, the refrigerants, the ergot, and a rupture of the membranes, if still intact. Should the flooding continue after the rupture, and the retraction of the os uteri render an introduction of the hand absolutely impossible, the tampon should be applied at once; and the precaution be taken to make compression over the anterior surface of the abdomen, particularly if there is any inertia of the womb, so as to prevent an accumulation of blood within the organ. And where the

flooding persists, notwithstanding these measures, so as to endanger seriously the mother's life, and if at the same time the non-dilated and undilatable neck should make it impossible to introduce the hand, ought we, according to the example of certain authors, effect delivery at all hazards, and introduce the hand by force? Upon contemplating the published cases of this kind, we are forcibly struck with the results of this style of proceeding. Almost all the patients died (21 out of 25 according to statistics by Simpson), and authors universally regard the operation as of the gravest character. We therefore think it prudent not to risk the injuries of the neck, which result so often from a forcible introduction of the hand, but if, after a few moderate efforts, the rigidity is not overcome, we would much prefer, if the case were urgent, to resort to Simpson's method, and first detach and then extract the placenta. Whilst the author of this process has certainly advised it too generally, it seems to us that it could be usefully employed in these circumstances, although, for our own part, we would prefer the use of the tampon.

Professor Simpson has, in consequence of these facts, proposed to separate completely, and bring away the placenta, whenever its insertion upon the neck has given rise to a hemorrhage which threatens the life of the mother. Although rather too absolute at the outset, Mr. Simpson has finally yielded to the numerous and valid objections made to his precept, so far as to confine its application to the following conditions: 1. When the flooding has resisted the principal measures, and especially the evacuation of the waters; 2. When the slight dilatation or development of the cervix, or contraction of the pelvis, render turning or any mode of artificial delivery dangerous or impossible; 3. When the death or immaturity of the fœtus restricts the duty of the accoucheur to caring for the safety of the mother. It is, therefore, especially with primiparous females, in cases of premature labor, or rigidity of the cervix and of its spasmodic contraction, of organic narrowing of the pelvis or of the genital passages, of the death or non-viability of the fœtus, and, finally, of extreme exhaustion of the mother, that the artificial separation may be practised. It is to be understood, he adds, that in cases of separation or of extraction of the placenta, the fœtus should be withdrawn immediately, unless the hemorrhage should cease, which it does in the great majority of cases.

Even with this reservation, we cannot approve of the advice of Mr. Simpson; for we think that when the flooding continues after the evacuation of the waters, and when the neck does not allow the hand to be introduced, there is some chance left of saving both mother and child by applying the tampon, being careful at the same time to compress the abdomen, in order to prevent the occurrence of internal hemorrhage.

We also think, that when an obstacle dependent on the neck, the soft parts, or the pelvis, prevents the termination of the labor, the tampon may be applied with advantage until the dilatation of the neck allows of the intervention of art; for I cannot see in what way, under these circumstances, the extraction of the placenta could facilitate that of the fœtus, which Mr. Simpson recommends to be practised immediately afterward. The obstacles which prevented earlier action exist none the less afterward. It is, there

fore, only when caring very little for the life of the child, in case of the death or non-viability of the latter, that one could undertake to separate and extract the placenta, if the hemorrhage were dangerous, in order to spare the mother the pain of applying the tampon.

Finally, it is hardly necessary to add, that if the neck is sufficiently dilated, the delivery should be effected as soon as possible, either by turning or by the forceps. When describing these two operations, we shall point out carefully the cases in which one or the other should be preferred.

A host of other remedies have been successively extolled, but I have not spoken of them, because I have never had an opportunity of employing nor of seeing them employed; besides, their mode of action appears, on theoretical grounds, to be of little value; and hence, in my opinion, their enumeration would uselessly burden the memory of students.

[§ 3. Treatment of Hemorrhage caused by Abnormal Insertion of the Placenta.

Having described in the foregoing paragraph the treatment adapted to hemorrhage caused by insertion of the placenta upon the orifice of the womb, the reader is referred to the account therein contained of the various hemostatic procedures applicable to such cases, as we have nothing to add to what will be found there stated. (See page 775, *et seq.*) Still, the importance of the subject and the danger involved in this form of hemorrhage, makes it proper to recapitulate briefly the best conduct to be observed.

Hemorrhage caused by abnormal insertion of the placenta is generally moderate at the outset: with each return, however, it becomes more profuse, the patient grows weaker, and consequently in a more unfavorable condition for supporting the inevitable loss of blood which will accompany delivery. Therefore we do not advise a very long-continued expectant treatment, and have no hesitation in recommending the tampon in order to arrest the recurrent hemorrhages, without waiting for the commencement of labor. What, indeed, are the grounds of complaint against the tampon? Is it that it is likely to induce labor? But when the placenta is inserted upon the mouth of the womb, the tampon is still the best means of arresting the hemorrhage under the circumstances. It ought, therefore, to be applied early, even should it be uncomfortable. At proper intervals, though as rarely as possible, it ought to be removed in order to allow the patient to urinate and permit the accoucheur to watch the progress of the labor, which usually commences before long. Then it should be reapplied until the dilatation is sufficient to allow delivery to be accomplished by turning. If labor does not come on soon, and the tampon give great annoyance, its application might be postponed until a fresh hemorrhage appears. Under the last supposition, plugging the vagina would be useless, though not injurious; therefore it should be had recourse to at the first recurrence of the discharge.

Next to the tampon, rupture of the membranes seems to be the most useful. But in order to do it with safety, there should be decided contraction of the uterus, the head should present, and the insertion of the placenta ought not to be central. If, notwithstanding the conjunction of all these favorable circumstances, the flow should continue after the membranes are ruptured, the operation would have the inconvenience of rendering internal hemorrhage possible through an effusion of blood into the cavity of the ovum. When the placenta is merely situated in the vicinity of the cervix and labor be clearly begun, rupture of the membranes is almost always productive of excellent results; still, should the state of affairs be serious, we would prefer to use the tampon.

We regard the application of the tampon as the heroic measure against hemorrhage from insertion of the placenta upon the mouth of the womb or near it, and rupture of the membranes as coming the next in order. The other procedures, detachment of the placenta included, we have less confidence in, and refer to what we have said of them in the preceding pages. (See *Treatment of Hemorrhage*, page 775, *et seq.*)]

§ 4. Recapitulation of Treatment.

I do not know better how to conclude my remarks concerning the hemorrhages that may affect females, in the course of the latter months of pregnancy, and during labor, than by placing before the reader a short summary of their treatment which M. P. Dubois caused to be distributed among the students that attended his clinique; for, as the Professor states, this table may be considered as a kind of *vade-mecum*. Besides, the reader will see by it how far I have conformed to his ideas, in the treatment of hemorrhages just given.

[After a very profuse hemorrhage has been arrested, the patient will be so weakened that she cannot be regarded as out of danger. Women sometimes succumb several hours after the discharge of blood has ceased, with symptoms which will be described hereafter in connection with the account of hemorrhage attendant upon delivery of the placenta, as also the treatment proper in such cases. (See *Accidents attending Delivery of the Placenta.*)]

A SYNOPTICAL TABLE

Showing the Treatment of External Hemorrhages before and during Labor.

BEFORE LABOR.

A. Moderate Hemorrhage.

Horizontal position.
Absolute rest.
Fresh air.
Cool acidulated drinks.
Restricted diet.
Venesection, if there are any symptoms of plethora.
Empty the bladder and rectum.

B. Profuse Hemorrhage.

Same measures as in A, excepting venesection.
At first cold applications — then,
Ergot ʒss divided into three doses, at intervals of ten minutes.
And, if these are insufficient, to apply the tampon, or perforate the membranes.

DURING LABOR.

Moderate Hemorrhage.

Orifice not dilated and undilatable.	Membranes entire.	Same measures as in A, excepting venesection, which is improper, unless the plethoric condition be well marked.
	Membranes ruptured.	*Idem* *Id.* *Id* *Id.*
Orifice dilated.	Membranes entire.	Same measures as in A, then wait, or rupture the membranes.
	Membranes ruptured.	*Id* *Id.*, then wait; if the pains are slow and feeble, administer ergot.

Profuse Hemorrhage.

Orifice not dilated and undilatable.	Membranes entire.	*Id.* *Id.*, except venesection, then refrigerants; and in case of inefficiency, and the pains are weak, ergot, then rupture the membranes; lastly, if the orifice should not permit version, apply the tampon.
	Membranes ruptured.	Same measures as in A, then refrigerants; then ergot, if the pains are slow and feeble; in case of inefficiency, compression of the uterus, tampon, forced delivery
Orifice dilated or dilatable.	Membranes entire.	Rupture the membranes; if this is not sufficient, make version, or apply the forceps.
	Membranes ruptured.	Version, if the head is above the orifice; forceps, if it is in the excavation; simple extraction, if the pelvic extremity present.

CHAPTER XII.

OF ECLAMPSIA.

Among the various convulsive diseases that may appear during pregnancy, parturition, or the lying-in, there is one which has such well-marked characteristics, and whose physiognomy is so peculiar, that I can scarcely comprehend the want of accuracy that still exists in most of our classic works on this subject. This confusion evidently arises from the fact that the authors who have written on puerperal convulsions have included under this title all the affections whose striking character is a convulsion; forgetting that the epithet *puerperal* should be applied, not to every disease which is developed before, during, or after labor, for then we might admit a puerperal pneumonia or pleurisy, but simply to one that is intimately associated with that state, and which is only produced during its continuance. This confusion is further caused, in my opinion, by designating as convulsions some affections that do not merit the name.

These two propositions will be easily sustained by an *exposé* of the distinctions admitted by some authors. According to them, the convulsions that occur during gestation may be either partial or general. Under the name of partial convulsions, they have described those affections whose principal character is a rapid, abnormal, and involuntary contraction of one or more muscular organs, and which, consequently, are convulsive; but which are otherwise so different from what has usually been comprised under the denomination of the convulsions of pregnant women, that it is with some hesitation, and only to avoid the reproach of having omitted any important facts, that I allude to them here. Thus, to give an example, those violent contractions of the stomach, observed in certain women who are affected with severe and obstinate vomitings during gestation, as also the palpitations of the heart experienced by some others, have been classed among the puerperal convulsions.

M. P. Dubois relates having seen the walls of the belly contract with such force, in a woman in the fifth or sixth month of her pregnancy, that the uterus was completely pressed back into the excavation; and the organ was afterward observed to return briskly to its place, and to rebound like an elastic ball when thrown on the ground. Some other tumefactions appeared in the flanks, in the epigastrium, and umbilical region, which seemed to depend as much on the spasmodic contraction of the viscera as on that of the walls of the abdomen. Nevertheless, this woman recovered without aborting.

M. Velpeau states, in his excellent thesis, from which I extract the foregoing case, that a countrywoman, aged twenty-two years, was much alarmed on the *tenth day* after her delivery by movements that took place in her belly; something like a globe was observed through the integuments and muscles, which would travel sometimes towards the excavation, at others towards the flanks, and again in the direction of the umbilicus. This species of ball would transform itself at times into several lumps, which traversed the abdomen with a rumbling noise; but the walls of this cavity always

seemed to preserve their normal suppleness. This woman died insane two years afterwards, *without these singular movements ever having altogether disappeared.* Can such a case be referred, with truth, to puerperal convulsions?

According to certain accoucheurs, the vaginal parietes are occasionally so violently contracted as to prevent the escape of the child, and even to benumb the hand of the attendant by their spasmodic action. But of all the partial convulsions, those of the uterus are the least questionable. We have already treated of the spasmodic contraction of the external and internal orifices of the neck, which are capable of retarding the labor greatly in ordinary cases, and, in breech presentations, may cause extension of the head, and thus render its extraction difficult; and we shall see, hereafter, (art. *Delivery of the Placenta,*) what influence this retraction of the orifices, which is evidently due to a convulsive contraction at the superior or inferior part of the cervix, as well as the partial one of some of the fibres in the body of the womb, may have over the delivery of the after-birth.

We shall only mention here, that other cases, similar to those detailed by M. Dubois, have been reported, in which the uterus has been observed to pass rapidly upwards, downwards, and towards the sides of the abdomen; and even to descend with such violence towards the vulva, that it was necessary to sustain the latter with the fingers to prevent it from escaping; but, for further particulars, we refer the reader to the essays of Baudelocque and Miquel.

The instances just referred to, doubtless resemble some of the features of the disease we are about to describe under the name of *eclampsia*, in being characterized by a rapid, abnormal, and involuntary contraction; but they differ from it so much, in the triple aspect of symptoms, prognosis, and treatment, that they cannot, in my opinion, be classed under the same denomination, without confounding things that are essentially dissimilar.

The question now recurs, what is the state of the case as regards the general convulsions of pregnant women? Hysteria, tetanus, catalepsia, and even apoplexy, have been observed during pregnancy and parturition, and have, on that account alone, been forthwith denominated as puerperal diseases; and although these affections offered the same symptoms as when they occur in the non-gravid state, though they were essentially different from eclampsia, properly so called, yet they were considered as mere varieties, or particular forms, of this latter complaint. True, there can be no doubt that hysteria, tetanus, etc., are modified by the peculiar condition of the pregnant female; and, as in all other diseases that occur during the puerperal period, the danger to which they expose the patient is increased by that to which they subject the fœtus; but the hysteria does not thereby become less an hysteria, and the tetanic convulsion has not the less its characteristic persistence. These are evidently, therefore, distinct affections.

I ought, however, to add, that the form of the convulsion may vary, and that an attack which at the outset presented all the characters of eclampsia, might finally assume the tetanic or even the cataleptic form. Supposing that no error of diagnosis has been committed, the latter are exceptional cases, in regard to which it is difficult to say whether the same disease has

assumed two different physiognomies successively, or whether one disease, catalepsy, has succeeded to another, eclampsia. Dr. Schmidt, of Paderborn, and M. Danyau, have each published a case of this kind of transformation. (*Journ. de Chirurgie*, 1844.)

Apoplexy may occur in the puerperal state, either as the principal disease or as a termination or complication of eclampsia. Often, indeed, as stated below, the puerperal convulsions determine a cerebral effusion; but then it is an effect, and not a cause, of the accident. There are likewise some cases in which the general circulation, as an effect of the remarkable modifications it undergoes during pregnancy, is strongly determined towards the brain, and may even result in an effusion; and if so, the latter is sometimes preceded by slight convulsions, or a tetanic stiffness in one or more limbs; but these soon pass away and do not reappear. Here, then, the apoplexy is the disease; but it is nothing more.

In my opinion, therefore, it must be admitted that, during the gestation, the parturition, or the lying-in, women may have attacks of hysteria, of tetanus, or catalepsy, or may be struck with apoplexy; but these are so many distinct affections, having but one common symptom with eclampsia—the convulsion. We hope that the details, into which we are about to enter, will illustrate the numerous differences between them.

For myself, I understand by the term eclampsia an affection characterized by a series of fits, in which nearly all the muscles of relation, and often also those of the organic life, are contracted convulsively, and which fits are usually accompanied with or followed by a more or less complete suspension of the sensorial and intellectual faculties for a variable period.

General convulsions (eclampsia, properly so called) constitute a quite rare disease. M. Velpeau did not observe a single case in a thousand labors superintended by him at the Clinique. It is probable, however, that this proportion is too small; for, by consulting the statements furnished by Madame Lachapelle, Merriman, Ryan, Pacoud de Bourg, etc., it appears that there was one case of convulsion in about two hundred deliveries. On the other hand, the practice of the principal accoucheurs of Great Britain would furnish one case of eclampsia in four hundred and eighty-five labors, nearly.[1]

It is, however, almost impossible to ascertain an exact proportion by consulting the practice of any single man, since great variations are observed

[1] Bland,	in	1,897	women, met with	2 cases.
Joseph Clarke,	"	10,387	" "	19 "
Merriman,	"	2,947	" "	5 "
Granville,	"	640	" "	1 case.
Cusack,	"	398	" "	6 cases.
Maunsell,	"	848	" "	4 "
Collins,	"	16,414	" "	30 "
Beatty,	"	399	" "	1 case.
Ashwell,	"	1,266	" "	3 cases.
Mantell,	"	2,510	" "	6 "
Churchill,	"	600	" "	2 "
		38,306		79

Thus we have 79 cases of convulsions in 38,306 labors, or 1 in 485, nearly.

in different years; in my own experience, for example, I met with but three cases in two thousand deliveries occurring under my care at the Hôtel Dieu and the hospital of La Faculté, whilst house physician at those institutions, whilst, on the other hand, I met with seven cases within the months of July, August, September, and October, 1846, whilst in service at the Clinique.

Eclampsia appears indifferently at all seasons of the year; although some authors have seemed to consider, improperly, I think, that certain atmospherical conditions are not altogether foreign to its production, and that it occurs more frequently in some seasons than in others. Madame Lachapelle, who appears quite disposed to adopt this opinion, notwithstanding the summary she furnishes sustains her views but very imperfectly, relies upon the fact that at the hospital of La Maternité, several individuals are nearly always affected at the same time. But I am strongly disposed to believe this circumstance is rather owing to imitation than to the influences of the atmosphere.

This affection is very unusual in the early months of gestation: M. Dan yau, Sen., however, met with it in a young girl, who had only reached the sixth week, and in whom nothing but the extraction of the ovum could remove the symptoms. The eclampsia came on again in her next pregnancy about the same period, and was followed by an abortion; but, in this instance, the fits continued for some time after the abortion.

A lady of Ferrara, about twenty-eight years of age, of a bilious temperament, and the mother of three children, was periodically attacked by convulsions as soon as she had conceived, and these attacks were renewed every two weeks throughout gestation; so that their appearance constituted in her a sign of pregnancy. It is very doubtful, however, whether her case was one of true eclampsia. As a general rule, they are quite rare prior to the sixth month; they are particularly frequent during parturition; and they appear somewhat oftener after the delivery than during the gravid state.

The period at which they are liable to occur after delivery varies greatly; though the eclampsia most commonly appears a few hours, or sometimes even a few days after delivery, examples are not wanting of its being postponed for eight, ten, or even twelve days.

§ 1. Causes.

The causes of eclampsia have been divided into predisposing and determining.

Upon a careful investigation of the individual conditions under which eclampsia is generally found to occur, we are forcibly struck with a singular circumstance, which entirely escaped the notice of the older observers: this circumstance is the almost constant presence of albumen in the urine of eclamptic women. I say almost constant, for, with the exception of six or seven cases mentioned by M. Depaul and Mascarel, in reference to which we shall have more to say hereafter, I am aware of nothing to limit the assertion. This very remarkable coincidence, which is at present well determined by the observations of many physicians, and which I have invariably remarked in all the cases which have come under my own notice

within the last eight years, evidently seems to be the dominant fact in the etiology of puerperal convulsions. Since the presence of albumen is discovered almost constantly in cases of eclampsia, the severest mind can hardly avoid establishing a more or less intimate relation of causality between the two facts.

But it has been observed, the presence of albumen in the urine does not constitute a disease; it is but the symptomatic expression of a local lesion, or of a general affection of the economy. The latter are doubtless capable of producing eclampsia as they had already caused albuminuria; but most frequently their influence is limited to the modification of the urinary secretion without producing any nervous disorder. This is true, and M. Blot was right so far as he considered these two morbid conditions as merely concomitant, and not that one was a consequence of the other. M. Blot's remark has not, however, in a clinical point of view, all the importance that has been attributed to it. Though the cause of eclampsia be attributed to an organic lesion of the kidneys or to an alteration of the fluids of which albuminuria is the symptom, it is nevertheless true, that as both these general or local lesions are to be detected with great difficulty during gestation, whilst the presence of albumen may always be discovered with ease, it was judicious to insist upon the importance of the albuminuria, which is alone capable, in most instances, of exciting a suspicion of the organic condition to which the eclampsia is apparently due.

Since albuminuria is present in the immense majority of eclamptic women, it, or rather the disease of which it is the symptom, may be rightfully regarded as the predisposing cause of eclamptic convulsions. I say the only known predisposing cause; for, since attention has been fixed upon this point, of all pregnant women, those only who are affected with albuminuria (a few cases excepted) have been known to be attacked with convulsions.

Though all eclamptic patients have albuminuria, it does not follow that albuminuria, however severe, necessarily gives rise to convulsions. Happily, it is by no means uncommon for pregnant women to have the urine highly charged with albumen without presenting a single convulsive symptom. Of 41 women with albuminous urine, observed by M. Blot, but 7 had convulsions; and of 20 mentioned by MM. Devilliers and Regnault, 11 only were affected with them. The latter gentleman, it is true, examined the urine of such women only as were dropsical, and it is very certain that many cases of albuminuria are not attended with infiltration. Still, by taking the mean between these different results, and having regard to my own observations, I think that I come near the truth in saying, that one out of every four or five patients with albuminuria will be affected with convulsions.

The amount of albumen in the urine increases greatly during the convulsive attack, and generally diminishes after it. This peculiarity has led some persons to inquire whether the eclampsia, instead of being due to the alteration of the urine, might not be the cause of it. I can understand why there might be hesitation in regard to this point, if a single case could be cited in which it had been proved that the urine was entirely free from

albumen for several weeks before the appearance of the accidents: this, I believe, has never been done, but often, on the other hand, albuminuria has been known to be present for some time before the convulsions occurred. Besides, when we come to reflect upon the obstruction the venous circulation produced by eclampsia, we can very readily account for the active congestion with which the internal organs, and the kidneys in particular, may be affected during the attack. Now, it is well known that renal congestion increases the secretion of albumen.

The organic conditions which produce albuminuria are certainly the most, I would even say the only ones, favorable to the production of eclampsia. This proposition, which is at present incontestable, explains the influence of certain circumstances which most authors have mentioned as predisposing causes: thus, among the latter has been classed as one of the most active, œdema of the lower extremities, when considerable, but, above all, general infiltration, invading successively the body, upper extremities, and face. It is now a well-ascertained fact, that this general œdema is almost always connected with an alteration of the urinary secretion, and that only when accompanied with albuminuria does it appear to give rise to eclampsia.

If it be true, as M. Rayer thinks, that the compression exerted by the developed uterus upon the renal vein may eventually produce hyperæmia, and then an inflammation of the kidneys, we are able to understand the mode of action of all the circumstances capable of increasing this compression. Thus, we can explain the possible effect of, 1, the extreme distention of the uterus, whether due to dropsy of the amnios or to the presence of several children; 2, of a first pregnancy, in which the uterus is strongly applied to the posterior walls of the abdomen, in consequence of the resistance of the abdominal parietes;[1] 3, why, according to the observations of M. P. Dubois, rachitis is often connected with eclampsia, since, in women affected with this disease, the small stature and limited space within the abdominal inclosure, obstruct the development of the uterus, which, by reacting in its turn upon the surrounding parts, forms a greater mechanical obstacle to the regular fulfilment of all the functions, and the venous circulation in particular. (See *Albuminuria*, p. 488.)

Whatever the cause may be, long-continued albuminuria necessarily occasions a notable diminution of the amount of albumen which enters into the normal composition of the blood. Hence it is extremely probable that this fluid, when thus altered, gives rise to a peculiar excitement of the cerebro-spinal centre, which becomes itself the direct cause of the convulsions, or, at least, which is more frequently the case, renders it more susceptible of the excitements which reach it either from without, or from previously irritated internal organs. These excitements, which, under any other circumstances, would have no effect, become here so many determining causes of an attack of eclampsia. (See *Uræmia*.)

[1] Seven-eighths of the cases of eclampsia have occurred in primiparous women (Lachapelle); in thirty-eight of those reported by Merriman, twenty-eight were of this class; and more than two-thirds of the instances given by Ramsbotham, and twenty-nine in thirty of those by Collins, refer to women who were delivered for the first time.

An alteration in the quantity or quality of the blood often gives rise to convulsions under other circumstances than the puerperal condition. M. Rayer, and several other observers, have called attention to symptoms resembling epilepsy, as one of the modes of termination of albuminuria caused by albuminous nephritis, and it is well known that convulsions often occur in the last moments of the unfortunate victims of profuse hemorrhage. It is, therefore, no cause for astonishment, that the alteration of the blood produced by albuminuria may have the same consequences during pregnancy. The reason why these nervous disorders are more frequent in pregnant women with albuminous urine than in the other diseases attended with albuminuria is, that to the only producing cause of epilepsy, in ordinary cases of albuminuria, are added the congestions to which the nervous centres are so liable during pregnancy and labor.

Although the convulsions are generally spontaneous, and may be attributed simply to the condition just mentioned, there are some whose appearance seems to be connected with a more readily appreciable cause, and which, therefore, may be justly regarded as a determining cause.

In the list of occasional causes, certain writers have included the most common and indifferent circumstances, the mere recital of which we shall spare the reader; but will simply mention strong moral emotions, whose influence, though incontestable, is in some cases hard to be explained. There are some, however, which, in reference to treatment, deserve a careful mention, for it is especially by removing the cause that the attack may be arrested, or at least rendered less dangerous.

The influence of the circumstances to which we allude is at first limited to organs at a greater or less distance from the nervous centres, and it is only secondarily that the irritation transmitted to the latter excites them, and gives rise to the convulsion. Thus it is that an irritation of the nerves of the uterus, vagina, bladder, rectum, or stomach, may become the determining cause of general convulsions.

A. *Uterus.*—All the causes of essential dystocia, which require longer continued and more powerful efforts on the part of the womb, may occasion an excitement of the sensitive nerves of this organ, which, when transmitted to the spinal marrow, is calculated to awaken the reflex action of the motor nerves. Under this head we would indicate a malformation or obstruction of the pelvis, a partial or complete obliteration of the vagina or vulva, organic alterations, and spasm of the body or neck of the womb, fœtal deformities, or monstrosity, &c. Unfavorable positions of the child have not, certainly, so great an influence as might at first be supposed. Churchill says that "the effect of unfavorable positions has been greatly exaggerated, for Drs. Clark, Labatt, and myself have witnessed but a single case of convulsions coinciding with a bad position in 48,397 labors." In cases of eclampsia the head is almost always the presenting part; but, as Tyler Smith remarks, the first attack does not come on at the moment the head presses upon the neck or clears its orifice, but rather when it distends the perineum, and partially dilates the vulva. It is then, especially, that a prompt termination of the labor puts an end to the convulsive attack by removing the pressure from the soft parts.

All the unfortunate circumstances that may complicate the labor and require the introduction of the hand, whether before or after delivery, should be mentioned as capable of producing the same excitation; such are encysted placenta, its abnormal adhesions, its partial or complete retention, the presence of large clots, retroversion of the uterus, &c.

B. *Intestinal Canal.*—The irritation produced by distention of the intestinal canal, and especially by the accumulation of large quantities of fecal matters, and the presence of worms or foreign bodies in the large intestine, is sometimes also the determining cause of eclampsia.

Both Merriman and Chaussier have insisted upon the influence of a saburral condition of the primæ viæ, which influence is, they say, sufficiently shown by the state of the tongue, and epigastric pain which the patient nearly always complained of at the onset of an attack.

The presence of indigestible food in the stomach appears, in some cases, to have been the cause of convulsions. John Clarke relates the history of several women who were so affected after delivery, in consequence of having eaten largely of oysters.

C. *Bladder.*—Lastly, the same may be said of irritation of the walls of the bladder produced by its extreme distention with urine. The curious observation of Mauriceau is well known, and Dr. Vines mentions an exactly similar case. In the latter, the convulsions which had for two days resisted the delivery and all the generally recommended means, ceased immediately upon withdrawing from the bladder, by means of the catheter, five pints and a half of a turbid and highly ammoniacal urine.

Numerous other predisposing causes have likewise been described, the influence of which, however, it must be acknowledged, is far more difficult to appreciate; thus, for instance, M. Baudelocque enumerates in his thesis, a residence in large cities, the use of small or tight garments, an over-succulent diet, the abuse of spirituous liquors, constipation, retention of the urine (pointed out by Delamotte), sexual intercourse, the suppression of an habitual discharge, too much sleep, want of exercise, the frequentation of balls or plays, anger, jealousy, bickerings, disappointments, &c. There can be no doubt that all these causes, by modifying or disordering the circulation, may render it more active, and thus facilitate a sanguineous determination towards the brain; but they should evidently be considered in the light of a secondary predisposition, which may be added to some one of those mentioned above.

Epilepsy has also been considered, though improperly, as constituting a predisposition to eclampsia; for, though the two diseases have a close analogy, yet those pregnant women who were epileptic before their gestation commenced, are less subject to attacks then than at any other time. Indeed, some authors have supposed that pregnancy suspends the epileptic fits altogether; but this is not absolutely the case, for they only occur then more seldom than usual.

Dr. Tyler Smith relates a curious case of an epileptic woman who had an attack immediately after what she regarded as the fecundating intercourse, and who experienced an entire suspension of the disease during the remainder of her pregnancy.

We would repeat, in terminating this etiological study of eclampsia, that the various determining causes exist very frequently without giving rise to convulsions. The reason of this is, that they are of themselves incapable of producing them, and have no real influence except in cases presenting in a greater or less degree the general or local lesion which occasions albuminuria.

A review of all the causes will enable us to explain their mode of action. It is evident that all of them have a tendency to produce an irritation of the nervous centres. This irritation is direct, when due to the immediate contact of vitiated blood, and indirect, or by reflex action, when it follows the excitement of a distant organ, as the bladder, uterus, &c. I am happy to find in the work of Scanzoni a confirmation of these views, long since proposed by me. Setting out with these ideas, Scanzoni divides eclampsia into, 1. *Reflex convulsion*, proceeding from the peripheral extremities of the irritated sensitive nerves; 2. *Spinal convulsion*, produced by direct irritation of the spinal marrow, which irritation is transmitted to the peripheral extremities of the nerves; 3. *Cerebral convulsion*, when the irritation resides in the brain, and is transmitted to the spinal marrow. The existence of this latter form is doubtful, and, for our own part, we are much disposed to believe that eclampsia always has its origin in spinal irritation. It is a fact, proved experimentally by physiologists, that irritation of the spinal marrow, of the medulla oblongata, or of the tuberculæ quadrigeminæ, gives rise to convulsions only, whilst irritation of any other part of the brain produces nothing of the kind. It is true that cerebral lesions may destroy voluntary motion, but involuntary contractions, the excess and disorder of which constitute eclampsia, are not affected by them in the least. The latter may be produced by irritation of the spinal marrow or of its nerves, even when the cerebrum and cerebellum have been completely destroyed.

§ 2. Symptoms.

Like Madame Lachapelle, we shall describe three orders of phenomena in the attack of eclampsia, which, under the triple aspect of diagnosis, prognosis, and treatment, are of great importance, namely, the precursory symptoms, those which are manifested during the fits, and those which are sometimes developed in their intervals.

A. *Precursory Phenomena.*— An attack of eclampsia scarcely ever appears unexpectedly, as it is almost always preceded by certain phenomena, which enable us to foretell its speedy invasion. Chaussier even supposed these to be so constantly present, that, in the few exceptional cases where the observers have not mentioned them, it was because they were of short duration, and, therefore, either passed away unperceived, or else were misunderstood. This opinion is, however, rather too unqualified. The precursory symptoms are sometimes absent, and, as M. Wieger remarks, the comparative frequency of the prodromes differs according to the periods at which the convulsions make their appearance. Those which come on before labor are, he says, preceded by premonitory symptoms in forty per cent. of the cases; those appearing during labor or the delivery of the placenta, have the symptoms in thirty per cent.; and such as are delayed until after delivery, in twenty per cent. of the cases.

These precursory phenomena are variable in duration; thus, for some days, though occasionally only for a few hours, before the invasion of the puerperal epilepsy, the patients complain of agitation or malaise; they are easily excited, are impatient and irritable; they experience a marked difficulty in respiration; and they suffer from an exceedingly poignant and acute pain in the head, which, like the megrim, occupies but one-half of the cranium, and sometimes is even still more concentrated, and appears fixed upon one coronal boss, or some other equally circumscribed point. This pain in the head, which is one of the most important diagnostic signs, nearly always resists all the curative measures usually employed; it is accompanied with nausea, or even vomiting, by vertigo, dimness of vision, tinnitus aurium, and sometimes by an acute pain in the epigastrium. (Chaussier, Denman.)

When these primary symptoms have lasted for some time, they acquire a greater degree of intensity, and are often complicated with a more or less marked disorder in the sensorial and intellectual faculties. The vision becomes affected, the sight seeming to be obscured by a thick mist, and the patient distinguishes objects less clearly; sometimes even, as in a case observed by Dr. Meigs, of Philadelphia, she sees only one-half of an object held before her.[1] The hearing is likewise less distinct; the touch not so fine and less delicate; the woman's countenance exhibits an unusual hebetude; the expression is fixed, the lineaments immovable, and she appears sunk in a deep abstraction, from which she can only be aroused with some difficulty; she scarcely comprehends the questions addressed to her, and very frequently replies incoherently. In a plethoric female, the pulse is full, slow, and hard, and the face is occasionally flushed and animated; on the contrary, where the patient is affected with anasarca, particularly if she happens to be of an irritable, nervous constitution, the pulse is small, hard, and contracted, the face is pale and the skin cold, especially on the extremities; and sometimes there is a slight chill, or an imperfect horripilation. In addition to these, some women experience pricking sensations and formications in the limbs.

When the eclampsia appears during labor, it is often preceded by extreme indocility and agitation; the uterine contractions also present for a time that peculiar character of continuity and irregularity which has gained for them the name of uterine tetanus.

The patient laughs and weeps alternately, and speaks with volubility. A state of hebetude and stupor sometimes succeeds to this extreme agitation.

[a. *Phenomena of the Attack.*—After the premonitory symptoms just mentioned have continued for a length of time, and in a degree which are liable to great variation, the first paroxysm occurs, and sometimes very suddenly. The very faithful picture of it drawn by M. Prestat in his inaugural thesis, would lead one to suppose that he was reading the description of an attack of epilepsy, so striking is the resemblance of these affections to each other. Dr. Soyre, to whom we are indebted

[1] It seems to me that these disorders of vision are not due, as hitherto supposed, to cerebral congestion preceding the eclampsia, but that, in at least the majority of cases, they are consequent upon the lesion producing the albuminuria. It is well known, indeed, that disordered vision, and even blindness, are not uncommon occurrences in Bright's disease.

for excellent works upon the disease, very properly, therefore, in his inaugural thesis, divided the attack of eclampsia into certain stages, as Dr. Beau had already done for the paroxysm of epilepsy. The only fault which we find with them both is for making the coma one of the stages of the attack, whereas it is but the end of it. We shall, therefore, admit three stages in the paroxysm of eclampsia: 1. The stage of initiatory convulsions. 2. The stage of tonic convulsions. 3. The stage of clonic convulsions.

1. *Stage of initiatory convulsions.*— These almost always begin in the face, the muscles of which are affected with very limited and very rapid choreic motions, readily perceptible through the skin. The eyelids wink very rapidly, but sufficiently to show the globe of the eye, which rolls upward and downward several times successively. The strongly contracted muscles of the alæ nasi dilate the nostrils; the mouth is partly open, and soon becomes distorted by the depression of one of its corners. The convulsions of the face are always more marked on one side than on the other; finally, the head inclines in the same direction, and approaches the shoulder.

At the same time, the limbs, especially the arms, are affected with convulsive jerkings. The forearms are violently pronated; the fists are closed, with the thumb either bent into the palm, or extended and inserted between the forefinger and the medius. This stage rarely lasts longer than a minute.

2. *Stage of tonic convulsions.*— Suddenly, the look becomes completely fixed; the countenance, taken as it were by surprise, and rendered immovable in the midst of its grimace, exhibits barely a few limited fibrillary contractions. The tongue is thrust out of the mouth, the masseters close the jaws strongly, and the tongue is badly bitten, unless care has been taken to push it in, or prevent the teeth from coming together.

The limbs and the trunk stiffen in the just described attitude; breathing is suspended, and there is an instant of general immobility, when death seems impending. This stage is very short, rarely lasting over a few seconds.

3. *Stage of clonic convulsions.*— Relaxation soon occurs, and the tonic spasm subsides to be succeeded by clonic convulsions, which appear simultaneously in various parts of the body, giving rise to shocks corresponding with alternate contraction and relaxation of the muscular system.

The face, which had been drawn to one side, returns to the median line; the head vibrates from one side to the other. The eyelids open and close suddenly, with rhythmic regularity. The orbicular, canine, and zygomatic muscles of the lips are jerking, and the patient seems to be chewing or endeavoring to mumble some words. Respiration is imperfect and quickened. The face is congested, swollen, and acquires a bluish or livid hue.

Air, mixed with saliva and blood from the wounded tongue, gives rise to a bloody foam, which fills the mouth and is discharged between the lips. The appearance of the patient is then truly hideous.

The convulsive movements of the limbs are generally quite limited in extent: if the woman is lying on her back, she retains the position without need of holding, and it is only necessary to take care that she does not fall out of bed.

The clonic convulsions occur twice, thrice, or even four times or more per second. Though this stage of the attack is generally short, it is liable to be prolonged; cases are noted in which it lasted ten minutes, and I know that I have seen it last for twenty minutes, by the watch.]

The muscles of the hollow organs do not remain altogether indifferent to the disorder in the external muscular apparatus; for the fecal matters, the urine, and the contents of the stomach, are often expelled by the convulsive contraction of the reservoirs in which they had accumulated.

The respiration is interrupted, noisy, and affected by continual jerkings without any regular order; sometimes, indeed, as Madame Lachapelle has observed, it is wholly arrested by the spasmodic contraction of the diaphragm and other muscles of the thorax.

According to Dr. Tyler Smith, the muscles of the larynx are contracted convulsively, so as to obliterate the glottis almost completely; hence the respiration is either suspended or noisy, and the inspiration short and quick; consequently, hematosis is either suspended or diminished. This momentary asphyxia explains satisfactorily the bluish, or even blackish color of the face and extremities, the swelling of the head and neck, which are gorged with black blood, as also the frightful turgescence of the skin, eyes, and tongue. The carotids beat violently, and the jugulars stand out prominently. The secretion of the salivary glands is increased by their congestion. The jaws are closed forcibly, and in consequence of the approximation of the teeth, and the quantity of saliva in the mouth, the air escapes with a hissing noise, and by agitating the saliva, forms a thick foam, which is expelled continually from the mouth. This foam is not unfrequently stained with blood from wounds produced in the tongue by the teeth.

The spasm of the pharynx renders swallowing impossible, so that substances placed upon the base of the tongue, remain there to the risk of producing asphyxia. In a case of this kind, Dr. Simpson (of Stanford) excited deglutition by placing the substance to be swallowed in the upper part of the pharynx, and sprinkling the face with cold water.

According to Dr. Smith, the muscular fibres of the heart may also participate in the general convulsion. The extreme lividity and turgescence of the entire surface of the body are sometimes greater in eclampsia than in ordinary asphyxia, the entire body being in the condition in which the head is found in persons who have been hung. Dr. Smith thinks that this state is attributable to the venous circulation; may it not be asked, he says, whether there is not a spasmodic contraction of the right auricle, giving rise to a congestion of the entire venous system from the vena cava to the capillaries? And is not this supposition confirmed by the autopsy, exhibiting, as it does, the ventricles and auricles completely emptied of blood?

A very remarkable circumstance, and one which seems to me to prove the uræmic nature of eclampsia, is the suspension for a longer or shorter time of the urinary secretion. I have had occasion, several times, to introduce the catheter during the attack, and have found the bladder quite strongly contracted, and entirely empty. In the majority of cases, I have not been able to obtain more than half a spoonful of urine, whilst in others it was impossible to extract a drop. It is well known that ischuria is one of the symptoms of poisoning by uræmia.

At the commencement of the fit, the pulse is full and hard, subsequently becoming smaller and almost imperceptible; the skin is hot and dry, and is soon covered by a profuse perspiration. This transpiration usually coincides with a diminution in the frequency and intensity of the spasm, and announces its speedy termination. While it lasts, the sensorial and intellectual functions are wholly abolished; the patient is conscious of neither sound nor light; the sensibility is entirely lost, and we may pinch, incise, or burn the

skin with impunity, and without her knowledge, and even without her recollecting it after the fit.

The effect of the convulsions upon the contractility of the uterus is extremely variable. During the attack, the uterus sometimes remains passive, astonished, as it were, at the universal disorder; whilst, on the other hand, there are cases in which, whether the eclampsia comes on during labor or precedes it, the contractions continue with their normal regularity Occasionally, also, it seems to participate in the general irritation, and expels the fetus very rapidly, even when the slight dilatation of the neck would appear to indicate that delivery was yet distant. This rapid expulsion, of which the patient is entirely unconscious, may escape the attention of the accoucheur, and in some instances the child has died asphyxiated between the mother's thighs, for want of the proper attentions.

I think, however, that these rapid deliveries are far less frequent than some accoucheurs imagine. The idea of an earlier delivery than usual may have had its origin in a neglect to ascertain the condition of the cervix, which may have become dilated without the consciousness of the female. Whenever I have been able to follow up the labor, the cervix has always appeared to me to dilate very slowly, and has often seemed to be contracted spasmodically, as though it participated in the general convulsions. The expulsive stage is, I think, shorter than usual, a fact readily accounted for by the energy of the uterine contractions and the slight resistance of the perineum, the muscles of which are in a state of resolution during the coma.

Although the fits do not accompany each pain, they nearly always come on just at the commencement of one. "This appears to me to be so manifest and decided," says Dewees, "that I think I could tell what is going on at the mouth of the uterus, without an examination per vaginam." This, however, is not always the case; for, under some unusual circumstances, the contraction appears only when the convulsion has reached the lower extremities. Therefore, although in the first case the uterine action appears to determine the convulsive attack, in the second it seems to be the consequence of it. It is possible that this difference may furnish an explanation of the variable effect of eclampsia upon the termination of labor.

The cessation of the convulsive attack is never abrupt; the movements and spasms gradually become less violent; the respiration is less hurried and more full; the face loses part of its lividity; the muscles are only agitated at intervals, and their action resembles that which is excited by passing a brisk electric shock through them.

In general, the first fit is of short duration, and not very violent; but, in most cases, the fits are repeated frequently, and the symptoms become more and more frightful in proportion as they are renewed; the succeeding one, say Merriman and Velpeau, being often heralded by an uncommon slowness in the pulse. In the latter paroxysms, Madame Lachapelle has remarked that the convulsive shocks are less considerable, and sooner over than the earlier ones, but that the comatose symptoms are more grave and persistent. I do not regard this as correct, but it is true that the comatose symptoms are more serious and persistent.

The duration of an attack is very variable. The first fits are commonly

the shortest, becoming more prolonged as they are renewed. At first, they last from one to two minutes, and afterwards from three to four; but they rarely exceed six to eight minutes. It is said that they have lasted for a quarter or half an hour, and even for a whole hour; but those authors who pretend to have known them to continue for several hours, have evidently regarded both the convulsive and comatose periods as parts of the paroxysm. The number and rapidity of the convulsions are equally variable; in nearly all cases, there are two or more, and sometimes they have reached as high as sixty. In some instances, there is an interval of several hours, or half a day, between them; while in others, on the contrary, only a few minutes elapse before the return of the next.

c. *Interval.*— The patient remains in a state of complete prostration during the intervals of the first three or four paroxysms; but she soon comes to herself, opens her eyes, and looks at everything around with astonishment; she scarcely recognizes the persons and objects about her, and cannot be made to comprehend the distress and anxiety of her friends and family, for she has no knowledge of what took place while the fit lasted; but in a short time her ideas become clearer, and at length she entirely recovers the use of her faculties. These lucid intervals are quite prolonged after the early attacks; but, as they are renewed, the moments of intelligence become shorter and shorter during their intervals, and the woman ultimately sinks into a state of profound coma or apparent death; from which she is only aroused by the return of fresh convulsive movements.

This comatose state presents all the characteristics of an intense cerebral congestion, of which indeed it certainly is a consequence. Even if it be supposed that during the convulsion the muscular fibres of the auricles present no obstruction to the return of the venous blood, the violent contraction of the muscles of the neck certainly compresses the veins there situated, and, by preventing the return of the blood, gives rise to cerebral congestion, which produces the insensibility during the attack, and the sleep which follows it. The stupor is profound, the face injected, the respiration stertorous, and the limbs are in a state of perfect flexibility; but the sensibility, though greatly blunted, is rarely lost altogether, for when we pinch the patient, or rub her roughly, she shows signs of uneasiness, and groans very much like individuals who are laboring under a severe concussion of the brain. However, the torpor may be such that the sensibility is entirely lost; but even then the female appears to be conscious of the pain caused by the uterine contraction, for, when the latter comes on, she evinces by her countenance and groans, the sufferings she experiences. The intellectual faculties seem to be wholly abolished, the pupils are dilated and insensible. In general, the pulse is strong and developed.

When this comatose state is about passing off, it changes into a somnolency, from which the woman may be aroused by speaking to her; and the sensorial faculties gradually return. When the torpor is dissipated, she complains of great fatigue, and of a feeling of painful weariness; then, at the end of a variable period, this prostration gives way to great anxiety, the prelude of a fresh attack.

§ 3. Termination of Eclampsia.

An attack of eclampsia may terminate either by recovery, by death, or by giving rise to some other disease. When the patient is likely to get well, the paroxysms are usually few in number, of short duration, and occurring after long intervals. During this latter period, the female recovers more or less completely the use of her limbs, as also of her sensorial and intellectual faculties.

When there is to be no return of the fit, the intellectual faculties are the longer in regaining their normal condition as they have been the more disordered, or as they have been suspended for a greater period. The memory particularly is much weakened, sometimes even is altogether destroyed, for the patient not only cannot recall what took place during the fit, but she has likewise forgotten the common occurrences of the few days preceding the invasion of the symptoms; and it is only restored by degrees, each hour adding some facts to those of which she had previously recovered the recollection. It is singular that this defect of memory is often limited to isolated words; thus some have been known to forget entirely the names of their nearest relatives; others could no longer recall the name of the street, or the number of the house they occupied; and certain others again had entirely lost the memory of dates.

Alphonse Leroy reports one instance in which a very singular aberration of vision followed some convulsive phenomena, that held the patient's life in jeopardy for several days; all the objects that were brought before her, and all the surrounding persons, looked black.

The sight and hearing likewise require a certain time for the recovery of their perfect integrity; the woman's general condition is thus gradually ameliorated, and ultimately she regains her usual health.

On the contrary, when the disease is about to terminate by death, the convulsive attacks are observed to last for four, five, or six minutes with great intensity; they occur in rapid succession, and during the interval that separates them, the female is sunk in a torpor, from which she cannot be aroused by any external irritants. The period at which death takes place under such circumstances is very variable, though in general it is between twelve and forty hours after the invasion of the first symptoms. Sometimes, however, the patient dies at the outset of the disease. The head, says M. Depaul, began to distend the perineum and appear at the vulva, and there was nothing to excite alarm, when I suddenly observed a change in the patient's countenance, characterized by convulsive movements, and grimaces, heralding eclampsia, and death followed immediately.

The child was extracted alive by the forceps, but it died a few minutes after with eclamptic convulsions.

Death may occur in the convulsive stage, or in that of the coma. In the former case it is evidently due to asphyxia, which is itself produced by the paralysis, or rather by the permanent contraction of the muscles of the chest and of the glottis;[1] in the latter, it is a result of the cerebral congestion, and sometimes even of a true apoplexy.

[1] This asphyxia might also result, according to Boër, as a consequence of the obstruction of the bronchial ramifications, in which a considerable quantity of frothy mucus sometimes accumulates.

Finally, there is no reason why we should not admit, with M. Aran, that death may, in some cases of eclampsia, result from a sudden a rest of the movements of the heart.[1]

Again, an attack may not be grave enough to end in death, and yet may give rise to several very serious disorders. For instance, when the eclampsia occurs in the commencement of the labor, the violent contractions of the womb may cause rupture of the organ, if the os uteri is not sufficiently dilated. Again, it is possible that the disorders in the circulation may occasion a cerebral congestion; and the consequent engorgement of the vessels of the brain may be such as to produce their rupture, which is followed by an apoplectic effusion, and, as a consequence, by hemiplegia. In plethoric women, this anatomical lesion might even be produced by the early paroxysms; and it is probably in this way that the cases observed and described by M. Méniere, under the name of puerperal apoplexy, might be interpreted.

A sanguineous determination may also take place toward the lung, and thus produce congestion of that organ.

As a possible consequence of the congestive condition of the brain and its membranes, we should also mention a state of irritation, which occasions and maintains for a longer or shorter time, a complete or partial delirium, and sometimes even, the symptoms of a true meningitis or meningo-encephalitis. Of the seven eclamptic women treated at the Obstetrical Clinic, whilst I was on duty, four presented evident symptoms of meningitis after the coma had entirely passed off; two of them died, and exhibited the anatomical characters of meningitis at the autopsy.

But independently of these unfavorable complications, which constitute so many new diseases for the physician to combat, there is another one which is less immediate, but not less rare, says Madame Lachapelle; that is puerperal peritonitis.

In conclusion, certain cutaneous or intestinal inflammations may result in consequence of the energetic measures employed against the eclampsia. Thus, the life of the patient has sometimes been endangered by an attack of entero-colitis. The sinapisms, also, which are then crowded on the lower extremities, are not felt by the patient, and may be forgotten in the general agitation; consequently, they remain applied too long, and thus produce erysipelas and severe vesications. A lady, reported by M. Velpeau, was attacked, on the second day of her convalescence, by a violent erysipelas over the whole leg, because the sinapisms applied there produced no effect at first, and therefore were allowed to remain on too long.

[1] The heart, says M. Aran, is a muscular organ, and as such is certainly liable to have its innervation affected, as also the properties with which it is endowed as a contractile agent, that is to say, its irritability, motor power, and tenacity

To whom, for example, is it not evident, that if the heart, which is sometimes known to be lacerated by its own contractions, should be paralyzed by an interruption of nervous action or by the loss of some of its muscular properties, death would be instantaneous? Would it not be equally so, if, instead of ceasing to contract, it should be affected with spasm, as happens to some of the external muscles? May it not be supposed that several convulsive neuroses, in which death sometimes takes place suddenly, as epilepsy, eclampsia, spasm of the glottis, &c., prove fatal less from deficient hæmatosis than from a complete and instantaneous cessation of the pulsations of the heart?

§ 4. Diagnosis.

The minute detail into which we have entered in describing the symptoms of eclampsia might possibly dispense with a return to its principal characters; but as there are some affections that have a strong analogy to puerperal convulsions, we shall again bring forward the signs by which they can be distinguished.

When considered as a whole, eclampsia is so easy to diagnosticate, and its symptoms are so well marked, that it really seems useless to recapitulate them; but it is composed of two widely different stages, the paroxysmal and the comatose, during either of which the physician may be called upon to decide what is the nature of the affection. Thus, during the paroxysm, it may be confounded with hysteria, epilepsy, catalepsy, or tetanus; while apoplexy, concussion of the brain, and the coma of drunkenness may be mistaken for it in the comatose stage.

However, in hysteria there is sometimes an alteration, but never a total abolition, of the intellectual powers; indeed, the sensorial faculties have an unusual degree of delicacy and perfection; there is no coma after the fit, and the convulsive movements are altogether different from eclampsia; thus, the limbs become forcibly flexed (instead of being extended,) and subsequently writhe with violence; there is a continual tendency to change the position, and the patient would certainly throw herself out of bed if she were not held down by vigorous arms. Again, an hysterical paroxysm is nearly always preceded or accompanied by the sensation of a ball rising from the hypogastrium towards the throat, which gives rise to a feeling of suffocation similar to that produced by strangulation.

Deglutition is very difficult or impossible, but the muscles are much less strongly contracted, and instead of that whistling respiration which indicates constriction of the throat, there are loud cries, proving a free opening of the larynx. There is almost never frothing at the mouth as in eclampsia. The thumb, instead of being flexed in the palm of the hand, is extended outside of the other fingers, which are flexed. Finally, hysteria generally appears in the early months, whilst eclampsia appertains more particularly to the termination of pregnancy.

But of all the convulsive affections, epilepsy is the most likely to be confounded with eclampsia. It is unusual, however, for the patients to utter a cry at the beginning of an attack of eclampsia, as is very common in epilepsy. This is the first point of difference as noted by Chailly and de Sailly, and which I can confirm from personal observation. Succeeding the epileptic paroxysm there is little or no coma, which is always present to a greater or less degree after puerperal convulsions. Still, as epilepsy is sometimes followed by a profound coma, it will be necessary to examine the urine, which will not usually be found to contain albumen as it would in a case of eclampsia.

Moreover, in the latter disease, microscopic examination of deposits in the urine within twenty-four hours after its evacuation, may detect the presence of the cylinders of fibrin described by German authors, as well as blood and mucus corpuscles and epithelial cells from the ureters.

It is well, however, to bear in mind that the same observation applies to

the presence of these cylindrical bodies in the urine as to the albumen and blood, namely, that sometimes few or even none are detected by the most careful examination; and the same thing has been observed in all varieties of Bright's disease. It has been shown by Weld, that the occurrence of these exudations is intermittent, and that, consequently, there are times when none are present in the kidneys. This explains why some observers, M. Blot, for example, have never met with them.

The persistence of the convulsive rigidity of the limbs distinguishes tetanus from every other disease. Finally, catalepsy presents as an essential character the singular peculiarity, — that the extremities often preserve throughout the whole fit the position which they happened to have at its commencement, or any one we can succeed in making them assume during this convulsive state.

The comatose stage of eclampsia will be distinguished from apoplexy by the following signs: it has been preceded by convulsive phenomena, which is not the case in the latter disease; all the extremities are in a state of complete resolution, and they have entirely lost their sensibility and mobility; and, most generally, only hemiplegia results as a consequence of the cerebral effusion. It must, however, be observed that, when the eclamptic paroxysms are frequently renewed, and the patient's intelligence has been lost for some time, the cerebral congestion, which keeps up the coma, may determine an effusion into the substance of the brain. Hemiplegic phenomena then appear at once, and it will be possible to detect, on the side opposite to the one where the effusion took place, a more complete loss of sensibility and mobility, though the limbs on the other side may be in a state of resolution. The reader will understand that, if the previous history were unknown, the diagnosis would then be very obscure. The loss of intelligence is always constant and total in eclampsia, whilst this phenomenon may be wanting in apoplexy, or be limited to a simple obtuseness.

In cases of concussion of the brain, the absence of all previous convulsions, together with the presence of the marks of a fall, or of a violent blow on the head, will serve to make out the diagnosis.

Lastly, the previous history of the patient, the ejection of the contents of the stomach mixed with a large quantity of alcoholic liquors, and the vinous odor of the breath of intoxicated individuals, will enable us to distinguish the coma of drunkenness from that of eclampsia.

§ 5. Prognosis.

Eclampsia is a very dangerous affection, but we cannot agree with Madame Lachapelle, who states that one-half of the women affected with it are lost. In order to appreciate this conclusion from the practice of the illustrious midwife, it is necessary to bear in mind the peculiar conditions in which the patients at La Maternité are placed. After consulting the numerous cases which I have had occasion to observe, I think I might safely say, that when the patients receive proper care in due time, the mortality is hardly greater than one out of three and perhaps four.

The prognosis varies, however, according to the cause that gave rise to the convulsions, to the stage of the puerperal condition at which they are manifested, and to the particular progress of the symptoms.

Of all the various predisposing causes, serous plethora, or a partial or general infiltration, says Madame Lachapelle, must give rise to the most unfavorable prognosis. This proposition now appears to us a great deal too absolute. General infiltration should doubtless be considered as predisposing to eclampsia much more than partial œdema; but when the disease has once appeared, the general or partial infiltration adds nothing to the gravity of the prognosis. This results evidently from the observations of MM. Blot, Regnault, and Devilliers. Thus, of four patients with eclampsia, observed by M. Blot, three died, whilst all of three others affected in the same way, but free from œdema, recovered. So, also, MM. Regnault and Devilliers, who had two deaths for two non-infiltrated cases of eclampsia, observed but five deaths for nine œdematous cases, and three others fell victims to later complications succeeding the eclampsia. In short, the patients with eclampsia and albuminuria, without œdema, give a mortality of 7 out of 15; and those with œdema, a mortality of 11 out of 51.

As albuminuria is almost always pre-existent to eclampsia, it can have no other effect than is referable to its longer or shorter duration and its quantity. Albuminuria of very recent date, or of the kind styled transitory, and which gives only a slight cloud by the use of reagents, will lead to a much less unfavorable prognosis than if it had existed for several months and had afforded a copious deposit of albumen. An old case of albuminuria always supposes an advanced disease of the kidney, or else an altered state of the fluid. The cases observed by MM. Devilliers and Regnault, prove that death then occurs most frequently either during the coma, or as a consequence of ulterior complications. The following table of 36 cases, by Braun, leads to the same conclusion.

Albuminuria.	No. of Cases.	Mothers Cured.	Died.	
			In the Convulsions.	Of Complications.
Very severe, ...	3	1	2	0
Very considerable, . .	7	3	3	1
Considerable, ...	14	9	4	1
Moderate, ...	8	7	0	1
Slight, ...	4	4	0	0

The convulsions that are developed in hysterical and epileptic patients, or in women of great nervous susceptibility, and those which succeed any acute moral emotion, are less formidable than those which have no relation with the former nervous state of the female. Finally, the eclampsia that can only be explained by the general alteration of the blood produced by albuminuria, is much more dangerous than that whose appearance seems connected with the irritation of some organ, as the uterus bladder, intestine, &c.; for in the latter case, *sublata causa, tollitur effectus.*

As the depletion of the uterus is one of the most favorable conditions for the cure of the paroxysms, it is evident that, other things being equal,

eclampsia is far more serious when it comes on at the commencement of the labor, than where it is not manifested until the dilatation of the parts is so advanced as to render a spontaneous or an artificial delivery both possible and easy. The convulsions are likewise more dangerous when manifested at an early period of the gestation; not only because the patient, in case of recovery, is exposed to fresh attacks during the remainder of this state, but also because the complete obliteration of the orifice, and the hardness and length of the cervix, will render the depletion of the womb impossible. It is unnecessary to add that, in this respect, primiparæ will be much more exposed than women who have previously borne children. The truth of this assertion has been questioned of latter time, but I am happy to find a *résumé* in the memoir of M. Wieger, which confirms it fully. Of sixty-five women at different stages of pregnancy, who were attacked with eclampsia, twenty-five died, either during the attack, or in consequence of subsequent complications. That which takes place after the delivery is the least unfavorable of all; or rather such is the opinion of Dugès; but I believe with Ramsbotham, that the prognosis would then be much more serious. I have remarked, says the latter, and here again I agree with him, that when the convulsions come on in the last stages of labor, and continue after the delivery, the woman generally dies; but if they are arrested by the delivery, they seldom return, and the gentle slumber which then succeeds is the signal of a prompt convalescence.

The course and intensity of the symptoms of a convulsive attack greatly influence its termination: thus, when the paroxysms are numerous and violent, and follow each other in quick succession, more particularly if the comatose state is prolonged during the whole interval that separates them, and when the patient does not recover the use of her sensorial and intellectual faculties in this interval, the prognosis is exceedingly unfavorable, for death most usually results.

Again, it must not be supposed that all danger is over when the labor is terminated and the convulsions have altogether disappeared; for according to Denman, Collins, and others, the patients are then much exposed to consecutive abdominal inflammations, which, as is well known, often compromise their existence.

After the complete cessation of the accidents, the albuminuria is generally found to disappear rapidly, so that sometimes no traces of it remain at the expiration of four or five days subsequent to delivery.

This circumstance is a happy one, since it justifies the expectation of a happy convalescence. But if the urine remains charged with albumen for ten or fifteen days after the termination of the eclampsia, a return of the accidents is to be feared, as I once observed, on the fifteenth day; or else it may be dreaded lest the alteration of the secretion might be due to a more advanced degeneration of the kidney, which of itself would be likely to endanger the woman's life.

If the prognosis is grave as regards the mother, it is at least equally so for the child, since it very frequently dies during the convulsions that take place in the course of the gestation or at the commencement of parturition, for the disorder created in the maternal circulation must necessarily affect

that of the fœtus. The latter may be affected with fatal eclampsia in the womb. I have sometimes seen it present a contracted state of all the muscles of the limbs, immediately after its expulsion; nor is it necessary to the production of the latter condition, that the mother's convulsions should have lasted for a long time. I saw (October, 1846) a highly infiltrated primiparous female, in whose case the complete dilatation of the cervix and powerful expulsive pains gave promise of a speedy delivery, notwithstanding a slight contraction of the pelvis, suddenly seized with an attack of convulsions. I applied the forceps immediately, and the child, whose heart was beating a few minutes before, was extracted without difficulty. It was dead, and the upper and lower extremities, those of the right side especially, were strongly contracted. The biceps muscles were extremely hard. M. Prestat mentions a nearly similar case.

Although the fœtus may escape the dangers to which the convulsions expose it whilst still within the womb, it is not yet entirely safe, for it is subject to a sort of hereditary influence, during the early part of its existence, which renders it liable to convulsions similar to those with which the mother was affected. Schmitt (of Paderborn) relates, that a woman in whose case an attack of eclampsia assumed for more than three hours the appearance of decided catalepsy, was delivered by the forceps of a living child. At five o'clock of the next day, the latter presented symptoms of catalepsy resembling precisely those of the mother, and died in spite of all that could be done.

But these are not the only dangers to which eclampsia exposes the child, for it is evident that version or the application of the forceps, which is then so often necessary, always endangers its existence more or less. Thus, of fifty-one children reported by Merriman, thirty-four were still-born, and seventeen were born alive; which statement, unfavorable as it is, proves at least that, contrary to the opinion of many accoucheurs, the child is not always lost; and that we should not regard its life as worthless in those cases in which the intervention of art becomes requisite.

Notwithstanding the gravity of the general symptoms of eclampsia, its effect upon the progress of gestation is not always so disastrous, for it has been known to continue in spite of long and frequent attacks. Generally, however, abortion or premature labor is the result, and that, whether the child be living, or whether it has perished in consequence of the violent shocks experienced by the mother.

However severe the attack may be, it is very unusual for the woman to die undelivered, unless the expulsion of the fœtus be prevented by a mechanical obstruction. Still, sudden death has several times been known to take place, four cases of the kind being mentioned by M. Wieger as having occurred in the practice of German accoucheurs. The Cæsarean operation was performed upon the bodies.

§ 6. Pathological Anatomy.

Thus far, *post-mortem* examinations have thrown no light on the nature of eclampsia, for most usually this disease leaves no appreciable anatomical lesion behind. Often, indeed, there is a little serosity found in the ven-

tricles or arachnoid cavity, and possibly a more or less evident congestion of the encephalic vessels; and when the affection has terminated in apoplexy, the dissection has exhibited either an apoplectic extravasation into the cerebral substance, or else a free effusion on its surface. But these are evidently nothing more than secondary lesions, the effects, and not the cause, of the convulsions.

In a woman who died from puerperal epilepsy, M. Prestat found a little body, of a stony consistence, and about as large as an ordinary pea, in the corpus striatum of the right side; and, in another case, M. Baudelocque detected an ossification of the dura mater. But M. Prestat was certainly correct in regarding such anatomical lesions as mere coincidences, for nothing would warrant the conclusion that a relation of cause and effect exists between them and the convulsions.

What we have stated in regard to the almost uniform coincidence of albuminuria with eclampsia, and to its common connection with lesions of the kidneys, sufficiently indicate that the anatomical lesions are hereafter to be sought for in those organs. For our own part, we have never failed to do so for the past ten years, nor do we hesitate at the present time to consider albuminous nephritis as one of the most common lesions after puerperal convulsions. As already stated, the kidneys have almost universally presented the anatomical characters of nephritis, the more or less advanced degrees of which appeared to coincide with the chronicity and abundance of the albuminuria.

Other observers, amongst whom I might mention MM. Blot and Depaul, state that usually they have met with no disease of the kidney, and regarding the above-mentioned facts as altogether exceptional, insist that in the majority of cases Bright's disease has no connection with eclampsia.

In the first place, I would call attention to the fact, that I do not regard Bright's disease as residing in the lesion of the kidney exclusively (page 491); and that although the kidneys should present nothing abnormal, the alteration of the urine is sufficient to prove its existence. I might, therefore, strictly pay no regard to the facts mentioned by my opponents; but let us examine whether, independently of the opinion which I support, the observations of MM. Blot and Depaul are of much value. They have found nothing, say they; but perhaps their not having done so is their own fault in not having examined sufficiently, and I have to acknowledge that hitherto I had committed the same error. Works recently published in Germany show, in fact, that the naked eye is entirely incompetent to detect anatomically the commencement of albuminous nephritis, and that the first degrees of renal alteration can be discovered only by the microscope.

The nature of this book does not permit me to enter into the anatomical and microscopic details found in Frerichs' work; but the researches of which I speak evidently show the small value of observations in which the microscope has not been employed. All negative facts should, therefore, be regarded for the moment as having no existence, and more accurate observations are necessary to determine whether or not there are cases in which the lesions of the kidneys are altogether wanting.

Henceforth, therefore, attention should be especially directed to the kidneys.

§ 7. Nature of Eclampsia.

As a consequence of the labors of those modern pathologists who have followed the impulse given by M. Rayer, eclampsia, which had been so long classed with the neuroses, that is to say, with diseases whose nature is entirely unknown, begins to be better understood. Whoever shall have read attentively what we have said of puerperal albuminuria (page 492), and of its relations with eclampsia (page 792), will perceive that we can no longer withhold our opinion as respects the nature of puerperal convulsions.

In the first place, let us return to what we regard as the fundamental fact, which must decide the whole question, namely, that eclamptic females are almost always affected with albuminuria. Now, the presence of albumen in the urine during the puerperal state, always denotes a general alteration of the urinary secretion. This alteration, as stated (page 492), first consists in a modification of the elements of the blood, which is soon complicated with a lesion of the kidneys, constituting its anatomical expression, as albuminuria and still later eclampsia are its symptomatic expression. Eclampsia is, therefore, the ultimate phenomenon of Bright's disease, whether it be merely a general affection or more especially localized in the kidneys.

It is positively shown by clinical observation that a very close connection exists between albuminuria and eclampsia. It becomes, then, a very important matter to trace back this connection from the latter to the former; and here it is that the theory of uræmia comes in, as explained in another part of this work, to which we refer the reader. (See page 498.) We confess, however, that the pathological assumptions there taken are far from being firmly established, and that the true explanation may be yet unrevealed; at all events, the fact remains that there does exist a relation of cause and effect between albuminuria and puerperal convulsions.

MM. Blot, Depaul, and some others, having raised several objections to this opinion, we shall next endeavor to appreciate their value.

"1. As albumen is not discovered in the urine of all pregnant women, therefore eclampsia is not necessarily connected with albuminuria and Bright's disease."

Supposing the observations upon which this first objection is based to have been well made, and some of them, at least, seem to me deserving of all confidence, they still do not prove incontestably what is desired. Albumen, indeed, is not found invariably in all individuals who, not being in the puerperal state, are certainly affected with albuminous nephritis; although very abundant at certain periods, it diminishes greatly at others, and sometimes even disappears entirely for a longer or shorter time, but only to return again rather later. These same intermissions may also be met with during pregnancy; and we may readily imagine that unless the urine of the same woman who afterwards was attacked with eclampsia, had been examined frequently and through a long period, it could not be concluded that she was not albuminuric, especially if the albumen should appear during the convulsive attack.

Furthermore, facts have been observed by Mazoun, a Russian physician, and referred to by M. Imbert-Goubeyre, which appear to me to answer the

objection still more completely. Mazoun mentions three cases in which the autopsy disclosed,—once, the anatomical type of the second degree of Bright's disease; once, a lard-like condition of the kidney; and once, the characters of the first degree of Bright's disease; yet, although the patients were observed daily for several weeks, albumen was never detected in their urine. Unless we admit that the fatty kidneys did not mark a case of Bright's disease, it must be allowed that this disease may exist exceptionally without albuminuria. I myself witnessed a case of the same character, which was afterward published by my colleague and friend, Dr. Fournier, in his thesis for the *Concours*. Now, if this is so, what can be concluded from those rare cases in which the eclampsia was neither preceded nor accompanied by albuminuria?

"2. When the kidneys present no alteration at the autopsy, can it still be said that the eclampsia was the consequence of albuminuria?"

I have already replied to this objection affirmatively, if we regard, as always should be done, the general alteration of the fluids, and also if the microscope has not been employed, for it alone can now enable us to say that no real alteration exists.

"3. The difficulty and rarity of the cures of Bright's disease are well known; how, then, if puerperal albuminuria is due to the same cause, explain the prompt disappearance of the albumen after delivery, and the rapid recovery of the patients?"

It is true that the albuminuria disappears quickly in a certain proportion of cases; but generally in those cases no eclampsia had taken place, or, at least, the patients recovered. Here, as was stated, it is probable that the blood was but slightly altered, and that the active or passive congestion of the kidneys produced by the obstruction to the venous circulation, contributed to a certain extent to the production of the albuminuria. We can then readily imagine that, one of the causes being removed by the delivery, the other might be incapable of maintaining the functional disorder; but it is not true to say that in other than these favorable conditions, the albuminuria ceases in a few hours. I have already quoted the statistics of M. Imbert-Goubeyre, from which it evidently follows that when the disease proves fatal, the albumen continues to the end; and that in a certain number of cases, which will probably be found to increase when the patients shall be followed more carefully, it passes into the chronic condition. I might add with M. Wieger, that the medium duration of the albuminuria in the non-fatal cases is from eight to ten days after delivery.

We see, therefore, that these objections have no great force, and are not of a character to invalidate the many good reasons which go to support our opinion.

We do not wish to deny absolutely the possible occurrence of *apparently eclamptic* convulsions, in the case of a woman in labor, who presents neither albuminuria nor any of the symptoms of Bright's disease. On the contrary, we believe that in some very rare cases, the reflex irritation produced by an extremely painful labor, or the violent congestion of the veins of the spinal column, occasioned by the extreme efforts of the woman, may over-excite the spinal marrow and give rise to partial or even general convulsions.

But we regard such cases as altogether exceptional, and would even be disposed to debar them from the title of eclampsia, and consider them as simple convulsions, hysterical or otherwise, in their nature. Such, at least, is the impression left upon us by the two cases of the kind which have come under our own observation; and the reading of the published cases inclines me to believe that most of them were not instances of real eclampsia.

§ 8. Treatment.

The management of eclampsia must necessarily be divided into the preventive and the curative treatment.

1. *Preventive Treatment.*

We have dwelt sufficiently upon the etiology of eclampsia to show the importance which we attach to albuminuria, or, rather, to the disease of which it is the symptom. The presence of albumen in the blood of a pregnant woman is the indication of a marked predisposition on her part to puerperal convulsions, and the best preventive treatment would be that which would result in the most favorable alteration in the condition of the blood, or in the amelioration of the renal affection which is the apparent cause of the albuminuria. Unfortunately, all the therapeutic measures employed hitherto in other conditions than the puerperal, have been very unsatisfactory. The tonic treatment, however, has seemed in some cases to be sufficiently useful to encourage new trials, especially during pregnancy, in which, as we have seen, the diminution of the albumen is attended by a lessening in the amount of all the solid principles of the blood. I would, therefore, have no hesitation in recommending the animal diet and the administration of iron, in cases of albuminuria complicating pregnancy.

A number of cases of albuminuria have been treated successfully by a purely milk diet.

Iron in the form of the tincture of the chloride, or in combination, as in Basham's mixture, is most generally recommended.

But, as we have already observed, convulsions almost never appear in a pregnant woman with albuminuria, unless some accidental circumstance, so to speak, should happen to excite them. They are usually connected with cerebro-spinal congestions, themselves occasioned by fortuitous circumstances, with serous plethora, or the mechanical obstruction to which the venous circulation is subjected during gestation and labor; therefore, the first object should be to prevent this congestion. On this account it is that bleeding should have the precedence of all others as a preventive measure. It should be practised several times during the latter months of pregnancy in such women as may present some of the symptoms of cerebral congestion;[1] it might also be practised with the happiest success in œdematous

[1] By way of showing the importance of venesection as a preventive measure, Dr. Dewees relates the following case: Mrs. ——, pregnant with her first child, was seized with frequent headaches towards the end of her gestation; she neglected to be bled, and was attacked with severe epileptic convulsions at the onset of labor, from which, however, she recovered. During her second pregnancy she was bled freely, and delivered without accident. In the third and fifth, venesection was not resorted to, and they were attended with convulsions; whilst, in the other gestations, she had recourse to this remedy, and was safely confined.

females, more particularly when the precursory phenomena of eclampsia shall be manifested. In the latter, we should also resort to the measures calculated to diminish the volume of the parts distended by infiltration, such as derivatives to the intestinal canal and urinary passages, the application of compresses steeped in cold water, or some aromatic decoction, and to punctures with the lancet. Nervous and irritable women, of a dry habit, will also be benefited by a moderate bleeding from the arm, and by lukewarm baths, repeated frequently during the latter months of pregnancy; and they should avoid all acute moral emotions, &c., with the greatest possible care.

Reserve is called for in the use of diuretics, for, although they are useful in certain cases, they may, in others, affect the progress of the disease unfavorably. Generally speaking, when there is no diminution in the amount of urine excreted, they should not be employed, for the increased urination would augment the waste of albumen, and consequently the impoverishment of the blood. When, however, the patient passes but little urine, it is important to increase the secretion, in order to prevent an admixture of the principles of the urine with the blood, and thus lessen the chances of uræmic intoxication. The preparations of squill, digitalis, juniper, &c., may then be used with advantage.

After venesection and purgatives have been tried, Drs. Collins and Johnson highly extol the use of tartar emetic, administered in such a way as to nauseate without producing vomiting. The quantity of tartar emetic is increased or diminished according to the intensity of the symptoms and the imminence of the disease. The same potion is also strongly recommended as a curative measure after the invasion of the convulsive attack.

Most happy results have been obtained when the cerebral symptoms are marked by the use of bromide of potash alone or combined with chloral. The doses recommended are from 20 to 30 grains each, repeated at intervals of 4 or 6 hours. When the patient is unable to swallow or to retain this, it may be given by enema. Chloral is recommended highly by Playfair and Lusk, but strongly condemned by Fordyce Barker, who says: "I am convinced, by observation of many cases, that it does not, like chloroform, allay reflex nervous irritability, and I am strongly suspicious that it excites it."

[Although it cannot certainly be known that the paroxysms of eclampsia will cease immediately upon delivery, it is nevertheless true that they then do very often diminish in frequency, and at last subside altogether. This fact explains the unanimous opinion of accoucheurs that delivery is a favorable event during an attack of convulsions. The question, therefore, arises, would it not be proper to induce premature labor, for the purpose of arresting the albuminuria of pregnancy and preventing a possible attack of eclampsia? The question, when entertained, has almost always been decided in the negative. Cases, in fact, are not wanting which go to prove that after proper treatment, especially bleeding, the albuminuria may subside, and that convulsions even, after having occurred, may cease, allowing the pregnancy to continue its course, and end with a favorable delivery at term. Considerations of this character, together with the observation that women affected with severe albuminuria have not been attacked with convulsions, intimate that the question of premature labor, as a preventive, is one which should be approached very carefully. Admitting all this, we still think that there are some exceptional cases in which premature labor, artificially induced, might be of advantage. Let

us suppose, in the first place, that a woman eight months pregnant, affected with albuminuria, and threatened with eclampsia, should have labor to come on prematurely and spontaneously. It is very certain that the latter circumstance would, by most accoucheurs, be regarded as favorable, and that nothing would be done to arrest it. Conceding this, we are not very far from accepting the idea of the induction of premature labor. It must not, however, be supposed that convulsions will only occur when the labor comes on, and that then their occurrence will be almost inevitable. On the contrary, it often happens that the patient is attacked with eclampsia before the end of gestation, and the labor ensues; in which case the prognosis is the less unfavorable in proportion as the labor is the farther advanced.

On all these accounts we think that the induction of premature labor in such cases ought not to be absolutely discarded, but would require as a justification for its proposal a conjunction of the following conditions: 1, that the eighth month of gestation should be fully accomplished, in order that the child might live without encountering too great risk; 2, that the albuminuria should be severe, or the patient experience some precursory symptoms of the attack of convulsions; 3, that it should be a first pregnancy, or else that the patient should have had convulsions during a previous labor; 4, that medical treatment, especially bleeding, should have been proved to be useless. Under these circumstances, premature labor, artificially induced, seems to me rational, and I do not hesitate to say that I would be disposed to have recourse to it unless subsequent facts should prove the fallacy of my present opinion.]

During parturition, the accoucheur should endeavor to modify or prevent the influence of the various causes of dystocia; thus, if the contractions assume the character of irregular, tetanic pains, he must attempt to restore them to their normal and regular type, by a resort to bathing, to the opiates, or belladonna, and to venesection; for it is an ascertained fact that the excessive agitation produced by these pains is often the forerunner of eclampsia in a nervous and irritable woman.

It were hardly necessary to call attention to the favorable effect that inhalations of chloroform might have under these circumstances, both by changing the character of the contractions, and diminishing the irritability of the nervous centres.

At the very commencement of the labor, the precaution should be taken to empty the bladder and large intestine, and to relieve the stomach of indigestible food, which might have an unfavorable effect, by vomiting.

All these measures are particularly indicated when the patient under care had previously suffered from convulsions in her former labors, for she is by that very fact predisposed to a return of them.

After the delivery, the accoucheur might often prevent this accident by carefully exploring the state of the womb subsequent to the expulsion of the child and placenta; and by assuring himself that it is well retracted, and that it contains no foreign bodies, such as coagula, or portions of the membranes or placenta.

2. *Curative Treatment.*

The curative treatment consists of the general measures that are applicable in all cases, and of the special means, which necessarily vary according to the period at which the puerperal convulsions are manifested.

A. *General Measures.*—At the head of the list of curative means we must

place sanguineous emissions, which have been resorted to under every form. To these, therefore, we must first have recourse; but, in the employment of this remedy, several questions, that are important in a practical point of view, are presented for solution. Ought we to employ general or local bleeding? And, if general, which vein is to be opened? And what quantity of blood should be drawn?

["After having tested myself," says M. Depaul, "and seen tested by others, the various modes of treatment recommended for eclampsia, I have no hesitation in expressing as my conviction that venesection should be regarded as of primary value. The bleeding should, however, be carried so far as to withdraw from the patient, in the course of a few hours, thirty-two, forty-eight, or sixty-four ounces of blood, according to circumstances and the effect produced."]

In a large majority of cases, general venesection will first be preferred; and the revulsive application of leeches or cupping will only be resorted to in those instances where the convulsions shall have followed a profuse hemorrhage. Where free bleeding has been practised, and the coma continues, notwithstanding, throughout the whole interval between the fits, thus announcing an intense congestion about the encephalon, we might apply leeches with advantage to the mastoid processes, or to the neck, and also, perhaps, around the malleoli.

Writers have sharply discussed the question as to what vessels should be opened; and arteriotomy in the temporal, bleeding in the arm or foot, and opening the jugular vein, have been extolled in turn. The advantages of blood-letting are very nearly the same, whichever vessel be opened; and, consequently, as venesection in the arm is by far the most easy, and as we can always obtain there as much blood as may be deemed advisable, this is usually practised, and, as a general rule, should be preferred.

It is very important that the vein should be opened largely, and that the blood should flow in a full stream. Should it dribble away, or the jet be very small, the bleeding, Ramsbotham says, is almost useless, and another vein had better be opened at once.

The quantity of blood to be drawn varies according to the patient's constitution, the violence of the paroxysms, &c., &c.: thus, in lymphatic individuals, we should, as a general rule, be satisfied with the extraction of fourteen to eighteen ounces; and if the symptoms still continue after this, and it be deemed necessary to keep up the sanguineous emission, it ought to be confined to the application of fifteen, twenty, or thirty leeches behind each ear.[1]

In plethoric women, after a copious bleeding of sixteen ounces, a second, of ten to fourteen ounces, might be resorted to, two or three hours afterwards, and perhaps even a third; but a fourth is rarely admissible, and we would preferably apply, instead, either leeches to the mastoid processes or cups to the back of the neck.

Bleeding has the double advantage of removing the congestion or irritation of the spinal marrow, and of preventing at the same time the cerebro-

[1] The reader will bear in mind that the leeches directed in the text are of the European variety, which extract a much larger quantity of blood than our own.—*Translator.*

spinal congestion, which takes place during the fit, and which may produce fatal disorders, or at least become indirectly the cause of a fresh attack.

General bleeding, even when carried so far as to weaken the patient greatly, does not surely prevent congestion of the brain or even effusion; for all these anatomical lesions have been observed in women who died after profuse bleeding by the lancet. On the other hand, when carried beyond certain limits, it may become itself the occasion of a fresh excitement of the spinal marrow, as is observed after all great hemorrhages, which almost always end in convulsions. The particular object, in applying leeches or cups to the nucha or behind the ears, is to supply the insufficiency of venesection, or to avoid any unfavorable effect which the latter might possibly have.

Though the gravity of the symptoms, and the fear of congestions and effusions in the brain and spinal marrow, may often call for bleeding, it should not be forgotten that the impoverishment of the blood of most eclamptic patients contra-indicates a too abundant loss of blood. It is proper, therefore, to bleed sufficiently to remove the congestions of the nervous centres or lungs, and to prevent apoplectic effusions, but going too far in this direction would involve the most deplorable consequences.

Simultaneously with the venesection, it is advisable to produce a salutary derivation to the intestinal canal and skin.

[We have already mentioned, under the head of *Preventive Treatment*, that Drs. Collins and Johnson had recommended the use of large doses of tartar emetic. When given in the style of Rasori, Dr. Legroux has found it to have a good effect even in cases of confirmed convulsions, and I had the same experience in one severe case. Unfortunately, however, this favorable result does not always follow.]

I think that, as a rule, emetics ought not to be given during the attack, being calculated to augment the convulsive movements and cerebral congestion by the retchings they determine; still, if there was good reason for supposing that the accidents were partially caused by the pressure of badly digested food in the stomach, vomiting should be encouraged either mechanically, by tickling the throat, or by the administration of an emetic.

Purgatives are much to be preferred, especially when the large intestine is filled with hardened fecal matters.

If the patient recovers her intelligence during the intervals, and she can be induced to swallow, we might exhibit castor-oil by the mouth in the dose of one or two ounces; or, still better, two grains of calomel every quarter of an hour, until it produces a purgative effect. If, on the contrary, she cannot swallow, a plan advised by Merriman might be adopted; that is, to put the calomel mixed with *moist* sugar in equal proportions between the lips and alveolar arches, or, if possible, into the mouth, and renew it until several stools are procured. If this latter measure be ineffectual, it will be requisite to act on the lower part of the intestinal canal by administering injections, rendered purgative by the addition of an ounce and a half or two ounces of castor-oil, or of the miel mercuriale, and, if necessary, by incorporating with it a few drops of croton-oil.

The fact that extreme distention of the bladder has occasionally appeared

to be the determining cause of the attack, should always lead us to ascertain the condition of that viscus by percussion, and to use the catheter if it should chance to be found distended.

There are yet some other measures that cannot be relied on when employed alone; but which, nevertheless, are too important to be neglected. We allude to sinapisms applied successively on the thighs, calves of the legs, and feet, to vesicatories, and to dry cups placed on the back of the neck, and on the lower extremities. I apply them, says M. Velpeau, to both thighs and the nape of the neck, so that they may act whilst we are engaged with the blood-letting, blisters, or leeches.

They have appeared to me, remarks M. Prestat, particularly useful in œdematous women; only it is necessary to watch their effects for a few days afterwards, lest their surface becomes gangrenous.

I place an application of the large cups of Dr. Junod[1] to the lower extremities in the first class of revulsives, as being the most powerful and prompt in their action of any. In a case of eclampsia, that occurred five hours after delivery, the symptoms lasted for thirteen hours; and the patient's condition became more and more dangerous, notwithstanding the employment of all the measures just spoken of. At the first application of these cups, the convulsive paroxysms disappeared; at the second the coma became less profound: and at the third, the patient regained her intelligence. In three other cases, the effect was not so rapid, although they appeared to have a favorable influence.

These cups are especially applicable when, notwithstanding large general bleedings, the application of leeches or scarified cups has failed to remove the symptoms. Under these circumstances, they have the immense advantage of opposing the cause which seems to drive the fluids towards the brain, by keeping a large amount of blood in the lower extremities.

Cold aspersions upon the face and chest, and tickling the nostrils, have sometimes had the effect to render the inspirations more easy and perfect, and thus defer the attack of convulsions. Harvey relates the case of a woman in labor, who was awakened from a deep coma by tickling the interior of the nostrils. Denman gives the history of a lady whose every pain was attended by a convulsion, until he put an end to the latter for the rest of the labor, by sprinkling the face at the beginning of each contraction by means of a feather dipped in cold water. Even if useless, the measure is too innocent a one not to be had recourse to.

Since the use of anæsthetics in obstetric practice, some accoucheurs have thought it right to employ inhalations in the treatment of eclampsia. Calculating upon the power of ether and chloroform to destroy the action of the muscles of animal life, they hoped that they might act in the same way upon the involuntary and spasmodic contractions resulting from puerperal convulsions.

Reasoning *a priori*, we were inclined to disapprove of their employment

[1] The apparatus of Dr. Junod consists of a large metallic boot, capable of receiving the greater portion of a lower extremity. The upper part of the boot is so adapted to the limb as to prevent the ingress of air, and a partial or complete vacuum is obtained by the use of an air pump.—*Translator.*

in a disease so often complicated with congestion of the brain, and even apoplexy, and were not, perhaps, free from prejudice, thus derived, in reading and analyzing most of the published observations. In the last edition, we, therefore, proscribed their use in the majority of cases, except when the beginning of the convulsion seemed due to some local irritation of an organ whose extreme sensitiveness awakened the reflex action of the spinal nerves. Other facts published by several colleagues as well as the result of personal observation, have greatly changed our first opinion, so that we are now convinced that when eclampsia comes on during either pregnancy or labor, and the closure or undilatability of the cervix makes it impossible to effect delivery, or when the attacks, having resisted bleeding and revulsives, are very frequent, and by their steadily increasing severity threaten the lives of both mother and child, then, we are convinced, the use of chloroform may be of some service. In two cases we found it to suspend the attacks completely. In one of these cases, two bleedings, purgatives by the mouth and rectum, &c., had been employed without advantage. The cervix was insufficiently dilated, and at 5 A.M. I used the chloroform, repeating the inhalations at the beginning of each pain, and continuing them until 9 A.M., at which time I was able to apply my forceps. Not a single attack occurred during this interval. After delivery I thought it right to stop the inhalations, and the woman became partly sensible. Some fruitless attempts were made to extract the placenta, and when, an hour after the birth of the child, it was brought away, another convulsion occurred. I immediately resumed the chloroform, and the attack was not repeated: short inhalations, however, being made during the hour succeeding. Both mother and child came out safely from the fearful trial. I might borrow similar cases from the theses of M. Blot and others, but will not dwell further upon this point, reserving its more detailed treatment for the chapter devoted especially to the study of anæsthetics in obstetric practice.

Such are the measures that ought to be primarily employed; but there are certain others which, without having the same efficacy, may however prove very useful. For instance, when the intervals between the attacks last for an hour at least, and during all this time the patient has recovered her senses, it is advisable to place her in a lukewarm bath, and whilst she is there, to keep compresses, steeped in some iced liquid, constantly applied on her head. This application of cold should be kept up throughout the whole duration of the attack; this measure has often seemed in our hands, says Madame Lachapelle, to second the venesection beneficially. It is particularly useful when a febrile coma succeeds the eclamptic paroxysm; as also when the occurrence of delirium announces the commencement of a cerebral fever.

The antispasmodics recommended by M. Velpeau in the hysteric form of eclampsia, that is to say, in the hysteria of pregnant women, appear to me useless in most cases of puerperal convulsions; and it would only be as a preventive measure, or else in a very slight attack, that they could be resorted to with benefit; besides which, we should lose precious time by depending on them in these grave cases.

Compression of the two primitive carotids, which has recently been pro-

posed as a remedy for most convulsive affections, has been successfully practised in some cases of eclampsia; and hence it constitutes another measure to which we might recur, without, however, attaching too much importance to its action, for it has failed in several instances. (*Journal de Trousseau*, Nov. 1840, p. 186.)

In my estimation, the opiates ought to be wholly banished from the treatment of a disease which so often terminates in cerebral congestions, at least whenever the condition of the patient is such as to allow of the abstraction of blood; but in the case of an anæmic female, or of one who has already been bled very freely, opium, by acting as a sedative to the nervous centres, might perhaps be productive of some advantage. (See page 1081.)

During the paroxysm, the necessary precautions must be taken to restrain the patient's dangerous movements; but it is not requisite to employ violence for that purpose, as some persons advise; for we have elsewhere stated that there is scarcely any tendency to change the position; and it will be quite sufficient to merely watch over her, without endeavoring to prevent the convulsive movements, the intensity of which might thereby be augmented.

Particular care is requisite to prevent the tongue from being bitten, since it is very liable to be pushed beyond the alveolar arches, and often becomes wounded by the convulsive contraction of the masseter muscles. To prevent such an accident, it has been advised to place some hard body, the handle of a spoon, for instance, between the teeth, so as to hold them apart; but Madame Lachapelle says this is an almost infallible way of breaking the incisors. Gardien directs a piece of cork to be put between the molars instead, as it would not be attended with this inconvenience; but this might escape from the fingers, and be drawn down, by an inspiratory movement, into the opening of the glottis, and thus suffocate the patient. A much more simple plan is to push back the tongue behind the alveolar arches with the fingers themselves, at the commencement of each fit; when, the jaws being once closed, the tongue can no longer protrude; it may be contused between the teeth, but that is all. Besides, this little operation may easily be explained to the assistants, who perform it without difficulty, as soon as they have overcome the chimerical fear of being bitten.

[A still more simple method has been, for a long time, in use at the Hospital of the Clinic. It consists in stretching tight between the two hands eight or ten inches of the edge of a towel, and applying it upon the dorsum of the tongue, at the same time pressing it strongly back into the mouth. The jaws are then free to close upon the linen without inconvenience to the patient or risk to the assistants. When the paroxysm subsides, the towel may be removed.]

B. *Special Measures.*—The course pointed out thus far might be considered as the medical part of the treatment of eclampsia.

But when, notwithstanding the employment of these means, the convulsions continue and increase in violence, what is to be done? The prominent condition being the first cause of eclampsia, it was natural to expect to find the most effectual remedy in the evacuation of the uterus. Such, indeed, is the opinion of almost all practitioners, and it was also our own, until within a few years past. Since, however, we have so often seen the convulsions continue for several days after the spontaneous expulsion or the extraction

of the fœtus, we have far less confidence in the immediate results of the cessation of pregnancy. As we have already said, the principal cause of eclampsia is to be sought for in a general alteration of the economy; now, although this modification is due to the course of gestation and sustained thereby, it is impossible that it should disappear immediately upon delivery. It remains for a longer or shorter time, and the woman returns but slowly to the normal state of the unimpregnated condition. Although lessened, it may still exert its influence, as is proved by the occasional occurrence of attacks several hours, and sometimes even several days, after delivery. To empty the uterus is, therefore, to attack but one of the remote causes of eclampsia, by no means the immediate one. Notwithstanding all these limitations, we do not reject absolutely the induction of premature labor, but will state hereafter the circumstances under which we think that it would be right to employ it.

In order to explain our view thoroughly, we shall examine successively the indications afforded by severe eclampsia, according to whether the convulsions are manifested in the course of pregnancy, or during parturition, or subsequent to the delivery.

1. *During the Gestation.*— Prior to the seventh month, that is to say, before the period at which the fœtus is viable, the treatment should be purely medical.

At a more advanced period two very different cases may present; that is, either the uterine contractions are prematurely and spontaneously developed under the influence of the general convulsions, or the womb remains entirely apart from the general disorders produced by the eclampsia. In the former case the labor has commenced, and we shall treat below of the means to be then employed, upon which most accoucheurs are agreed; but, in the latter, the proper course to follow is far from being so clearly marked out. The question naturally arises, what then is to be done, supposing the eclampsia has resisted venesection, the intestinal and cutaneous revulsives, etc.; and supposing that the patient has arrived at the eighth or ninth month, and the labor has not commenced, but still the convulsions continue and threaten the mother's life?

[Induced labor and forcible delivery have both been recommended under these very serious circumstances. In regard to the first, it may be said that the measures commonly employed to excite uterine contraction, act too slowly to be used in cases in which we suppose the life of the patient endangered by convulsions which have already lasted for a long time, and against which all therapeutical resources have been exhausted.

Premature artificial delivery has, therefore, had but few partisans, because it requires considerable time, whilst eclampsia pursues its course rapidly, so that its termination by recovery or death will have taken place before delivery can be effected.

This condemnation has not, however, been universal. Chailly, Krause, and many others have succeeded, and do not hesitate to advise it. It is also fair to state that we are now in possession of means for bringing on labor very rapidly, (see *Premature Artificial Delivery*,) which is a consideration that ought to incline the balance in favor of active intervention. Inasmuch as the chances of success are certainly very small, we think that induced labor ought to be reserved for cases in which the disease progresses notwithstanding the use of copious bleeding and other allied measures.]

There are certain females who are subject during pregnancy to repeated attacks of convulsions at variable intervals, and in whom, also, each fresh attack is more serious than the preceding. The recurrence of these attacks every eight days or two weeks, compromises increasingly the life of both mother and child, and we might reasonably fear lest another should prove fatal to both individuals. Now, although we have rejected the provocation of labor during the attack itself, we think it proper in the cases just mentioned, but it should be practised only in the intervals of the convulsive paroxysms.

Forcible delivery would seem likely, by emptying the uterus at once, to afford some chance to the patient.

But at a period still quite distant from term, the length of the neck, and the resistance of its unsoftened internal orifice, would render the forcible introduction of the hand very difficult, and the efforts required to penetrate within the womb are very likely to excite, to irritate the organ, and consequently, to increase the general convulsions.

These resistances, and the general irritation which they produce, are so great in most cases, that efforts have been made to overcome them by making numerous incisions around the circumference of the cervix. Doubtless, when the neck is effaced either by the progress of gestation or by premature contractions, these incisions may be useful and harmless, since they are practised upon the intra-vaginal portion of the neck only; but in the eighth month, whilst the neck retains its entire length, the greatest difficulties are presented at the internal orifice and upper part of the cervix. To incise the external orifice, would remove only the least resistance, and I think that no surgeon would have the temerity to apply a cutting instrument to the internal orifice. I have yet no experience in such cases, but am convinced that when the incisions have been successful, it has been in cases of far advanced pregnancy, or when unobserved contractions had dilated the upper part of the cervix. This, happily, is what takes place in most cases of long-continued convulsions, but which we exclude from the supposed conditions.

Admitting, however, that a forcible introduction of the hand, whether preparation have been made or not by incisions, can be effected without much difficulty, it must not be supposed that the extraction of the fœtus is unaccompanied by danger. We have supposed the uterus to be inert; now, although the irritation produced by the hand of the accoucheur and the movements impressed upon the fœtus during its extraction, are calculated to excite contractions, is there not cause to fear lest inertia of the organ might result from this too rapid depletion, and become the source of fresh accidents?

If, finally, after having overcome all these difficulties, we were sure that the eclampsia would cease, I could understand how such an operation might be undertaken; but as experience proves the contrary, I think that during pregnancy, however severe the convulsive attack may be, forcible delivery ought not to be attempted.

2. *During Labor.*—The prompt termination of the labor, so generally advised, should not, however, be practised except with a certain degree of

reserve; and, for the sake of clearness in this recapitulation of the indications, we shall endeavor to solve the following questions in order:

What ought to be done when the cervix is dilated or dilatable? And what is the proper course to pursue when it is neither sufficiently dilated nor dilatable, to permit a prompt artificial termination of the labor?

a. The cervix is dilated or dilatable.—If the head has descended into the excavation and distends the perineum, or presses strongly upon the circumference of the uterine orifice, if but one or two attacks have yet occurred, and especially if there is reason for supposing that extreme sensibility of the cervix or of the soft parts, may have had any agency in the production of the eclampsia, the forceps should be applied immediately. It is under these circumstances, more particularly, that the immediate termination of the labor prevents a recurrence of the accidents.

If the eclampsia is slight, though it has lasted for a certain time, that is to say, if the convulsive attacks are moderate and the intervals between them long; and if the woman regains her consciousness entirely during the interval; if, under these circumstances, the labor is advanced, the dilatation complete, and the head of the child has passed through the orifice and descended deeply into the excavation; if the uterus contracts powerfully, and if the perineum is not too resisting, we think it right to wait for the expulsion to take place naturally.

But if, under the same conditions, the pains are feeble, distant, and inefficacious, or if the contractions are energetic, but the convulsions are frequent and prolonged, with profound coma during the interval of the paroxysms, we believe that the mother and infant should be immediately relieved from the dangers that threaten them, by the application of the forceps.

When, so far from having cleared the os uteri, the head is still retained above the superior strait, especially if the membranes are still intact, the pelvic version would in general appear preferable to an application of the forceps. (See *Forceps.*) We say that the version would appear *in general* not always preferable, for we know this is at times impracticable, even where the head is still above the abdominal strait. The almost total discharge of the amniotic liquid, and the violent contractions of the uterus, which often participates in the general convulsions, and the violent irritation that the organ has to support during the introduction of the hand and the evolution of the fœtus, sufficiently explain our reserve, as well as the preference that we accord to the forceps in this particular case.

Should the face present, and be well down in the excavation, we would likewise apply the forceps; but, on the contrary, we should have recourse to the pelvic version if it were yet above the superior strait, or even when engaged in this strait, if it happened to be in a mento-posterior position. In the presentations of the pelvic extremity, it is advisable to hasten the termination of the labor by drawing judiciously and carefully on this extremity. In the presentations of the trunk, the feet are to be brought down; for we would only have recourse to the cephalic in preference to the pelvic version, when the pelvis is greatly contracted; and when the cephalic version is resorted to, it must evidently be followed by a prompt application of the forceps, and, if these should fail, of the cephalotribe.

b. What is to be done when the cervex is neither dilated nor dilatable?— If the membranes are not broken, and more particularly if the uterus appears to be greatly distended by a large quantity of water, they should be ruptured, and a discharge of the liquid and a partial depletion of the organ be facilitated, by pushing up the presenting part with the finger; for such a rupture has often proved sufficient to diminish the frequency and intensity of the convulsive paroxysms, and has justified the accoucheur in waiting for the complete dilatation of the cervix. But if the distention of the womb is not so far from normal, we think that the interest of the fœtus demands that the membranes should be respected, and spontaneous dilatation awaited; when this dilatation progresses too slowly, the ointment, or, still better, the extract of belladonna should be employed, and be smeared over both the internal and external portions of the orifice.

But, supposing the eclampsia is more serious, the coma still continues, and the convulsions have not been alleviated by the rupture of the membranes; and, moreover, the os uteri is not yet dilated, or else is so convulsively contracted as to prevent an introduction of the hand or instruments, are we, under such unfavorable circumstances, to abandon the delivery to nature, as some accoucheurs advise? Or, on the contrary, ought we to penetrate forcibly into the uterine cavity, by opening a route by violence, or a cutting instrument?

At the commencement, or even during the first four or five hours of labor, these extreme measures doubtless should not be resorted to; but when the convulsions persist, notwithstanding the employment of the most rational means; when ten, twenty, or thirty hours have elapsed since the onset of the symptoms; when the woman's life is compromised by the duration and the constantly increasing intensity of the paroxysms, our only hope is in a depletion of the uterus; a forced delivery then appears to us the sole resource, and authorized by the interest of the child even more than by that of the mother.

Two plans have been proposed for effecting this object, namely, a forcible introduction of the hand into the womb, and the division of the cervix by the aid of a cutting instrument. We shall hereafter revert to the mode of operating in both cases, when describing the difficulties that may be met with in making the pelvic version; and will therefore only remark here that, by the length of time it demands, by the excitement and irritation thereby produced (all of which are assuredly calculated to increase the convulsions), and by the lacerations to which it gives rise, however carefully it may be performed, the forcible introduction of the hand into the womb is very dangerous and ought to be rejected; and that, unless there is a very feeble resistance at the orifice to be overcome, repeated incisions, made at divers points of the circumference of the neck, ought, in our opinion, to be decidedly preferred.

But, whatever operative process be employed, the resistance from the os uteri being once overcome, the labor will be terminated by an application of the forceps, or by the pelvic evolution, according as the conditions shall be found more or less favorable to the practice of the one or the other operation; which conditions will be carefully detailed when we shall treat of version and the forceps.

Inasmuch as the expectation, recommended by us when the cervix is neither dilated nor dilatable, except in cases of imminent danger to the mother, is opposed to the generally received opinion, it becomes necessary to defend it. Although regarding in a general way the termination of the labor as a favorable condition, we are far from according to it the happy effect claimed by some authors in its favor.

In no case, indeed, in which the eclampsia had existed for a long time before we were called to the patient, have we ever found the termination of the labor to put an end to the symptoms, and very rarely did it ever lessen their intensity. The convulsions continued after delivery with the same frequency and violence as before. In three cases only have we known them to cease after the application of the forceps; but here it must be said, that having witnessed the commencement of the eclampsia, we were enabled to extract the fœtus immediately after the first attack.

If, therefore, we regard only the interest of the mother, we think that the intervention of art is justifiable only when the dilatation of the cervix renders it easy and but moderately irritating to the maternal organs; but if the fœtus is living, its life is seriously endangered by a too long continuance in the cavity of the uterus, especially after the rupture of the membranes; and since the termination of the labor, when prudently effected, does not sensibly increase the dangers to which the woman is exposed, we think that the child should be extracted as early as possible.

3. *After the Delivery.*—The only special indication, presented by the eclampsia after the child's expulsion, is to extract the after-birth and all the coagula, together with any portions of the membranes that may have been retained in the uterus; and to remove the sanious matters and detritus by detergent injections thrown up into its cavity.

But if the introduction of the hand should prove too difficult and painful, it should be withheld; for the retention of the foreign body would be much less irritating, and consequently less painful, than ill-timed attempts at introduction.

Dr. Fordyce Barker has recently added to the knowledge of puerperal convulsions, and given us the result of an extended experience in the treatment. In concluding a study of the various theories suggested by Frerichs, Rosenstein, Hicks, Frankenhäuser, and others, he says: "Clinical observations have established these facts, that the following conditions are predisposing causes of convulsions in pregnant, parturient, and puerperal women; viz., albuminuria, hydræmia, anæmia, urræmia, and primiparity."

He also regards an inherited nervous temperament and atmospheric influence as predisposing causes. In such cases, the presence of albumen in the urine should make us apprehensive of puerperal convulsions. He recommends "the removal of renal congestion by saline and hydragogue laxatives, which diminish, by exosmose, the excess of serum; by mild diuretics and the free use of mineral drinks, to carry off the cylindric exudations that obstruct the uriniferous tubes; the curé of anæmia by the chlorate of potassa and iron; a nutritious diet, and moderate exercise in the open air; the relief of local congestions, uterine, renal, and cerebral, by judicious venesections, are all prophylactic measures against puerperal convulsions."

To arrest and prevent convulsions, after venesection and the administration of a brisk cathartic, he recommends the administration of chloroform by inhalation, which should be proportioned to the violence and frequency of the convulsions. When the attacks are severe and recur at short intervals, a profound anæsthesia should be induced, and may be kept up under these circumstances for five or six hours, if necessary. To allay nervous irritability and prevent the return of the eclampsia, he administers, hypodermically, a full dose of morphia—that is, from 10 to 12 drops of a solution of 16 grains to the ounce of water. The hypodermic administration of morphia he regards as the most efficient means yet known for allaying that irritation of the spinal system which culminates in convulsions.

When these means are unavailing to arrest the convulsive attacks, and labor progresses, everything should be done to advance it. Should the cervix remain undilated, it is the duty of the accoucheur to bring on labor as soon as possible, "whenever delivery by art can be effected by less irritation than would be produced by the continuance of the child in the parturient canal." During labor, he does not recommend the hypodermic use of morphia, but relies exclusively on the chloroform to allay nervous irritation.

CHAPTER XIII.

OF CERTAIN DISEASES THAT MAY COMPLICATE LABOR.

Independently of the various accidents just studied, which have a special relation to pregnancy and parturition, there are yet some other affections whose existence at the time of labor may render the delivery dangerous, difficult, or perhaps altogether impossible, without the intervention of art. Thus, hemoptysis, hematemesis, or an aneurismal tumor; asthma, syncope, the presence of a hernia, or the loss of strength in a woman who is enfeebled by some chronic disease, traumatic emphysema, or fracture of the sternum, may individually complicate the delivery; and, therefore, they claim the particular attention of the accoucheur.

A. *Hemoptysis; Hematemesis.*—When the patient under care happens to be affected with hemoptysis or hematemesis, and the hemorrhage is inconsiderable, there is nothing to be done; but if it does not abate, or if it suddenly augments in quantity during the pains of child-birth, we must endeavor to remove the patient from the danger that threatens her, by terminating the labor as soon as the dilatation or the dilatability of the os uteri will permit, by an immediate application of the forceps or the pelvic version, according to the particular conditions in which the parts of the child and those of the mother shall be found.

B. *Aneurismal Tumor.*—The same indications for treatment also present where the patient has a moderate-sized aneurism, more especially if it occupies one of the large vessels of the abdomen and chest. In fact, the reader must foresee how greatly the tumor would be exposed to rupture during the violent strainings to which the woman involuntarily gives way during the second stage of labor.

Chronic diseases of the heart, whether consisting in an hypertrophy of the organ, or simply in alteration of the valves or contraction of the orifices, are but too often, as M. Aran has recently demonstrated, the cause of sudden death, not to call for some special attention during labor. It would seem to me very imprudent to allow the expulsive stage to continue too long in such cases, and I should think it right to terminate the labor artificially as soon as possible.

c. *Asthma.*—The same course is to be pursued in all cases where any considerable obstacle to the respiration is found to exist; as happens in asthmatic persons and in women of small stature, in whom the uterus is so enormously distended as to press up the diaphragm and lungs towards the upper part of the chest, and in whom the respiratory functions have, on this account, been disordered during the latter months of pregnancy.

d. *Hernia.*—Where a hernia exists, every one must understand, says Desormeaux, what disastrous consequences might result from the violent throes of the latter stages of labor; and how much these tumors must then be exposed to an increase of size, and how liable they are to become strangulated. The accoucheur ought to prevent these accidents, by reducing the hernia as soon as possible, if it is reducible; endeavoring to return it during the interval between the pains; and, when the contraction comes on, he will make a strong compression over the hernial opening by his fingers, or, still better, with a convex pad, to prevent its coming down. But if it is irreducible, he should apply a convex pad, or merely support the tumor with the palm of his hand, so as to prevent the expulsion of new parts during the pain. Finally, if, notwithstanding all these precautions (which the accoucheur ought to attend to himself, unless he has an assistant upon whom he can rely,) the hernia becomes strangulated, he should immediately terminate the labor, as in the foregoing cases.

e. *Syncope.*—There are certain very delicate or very irritable females who are apt to fall into a state of syncope from the occurrence of the most trivial pain. In such cases, where the faintings are dependent either on a restricted diet, on a previous hemorrhage, or on some former disease, it is necessary to keep up the patient's strength by some light nutritive articles of diet, such as broth, and by a little generous wine or cordial. If these measures prove to be insufficient, and the swoonings are renewed so often as to threaten her existence, we must terminate the labor. However, this measure is not to be prematurely resorted to, for these syncopes may be owing to some trifling cause or nervous condition, without there being that extreme debility, which alone, says Gardien, can authorize this ultimate step to be taken. Desormeaux says, I have seen such faintings renewed at every pain, in a woman who was pregnant with twins; and they lasted throughout the interval from one pain to another, so that the patient was only aroused from that state by the effect of, and during the time of, the contractions; nevertheless, the labor terminated spontaneously and happily for both the mother and children.

Baudelocque gives the history of a woman who died during labor after repeated syncopes but the autopsy proved that these latter, as also the vomitings and diarrhœa that accompanied them, had been produced, not by the labor, but by the presence of a calculus, about the size of a small nut,

in the gall bladder. It is really very difficult to accept such an explanation as this, especially as so many examples of quite as sudden death are on record, of which no other explanation can be given than such as attaches to the phenomena of the labor itself.

Dr. Davis relates a much more extraordinary case of the kind. A poor woman had been five hours in labor at the Charity Hospital; the membranes were ruptured, and a large quantity of the waters escaped, but from that moment the patient became excessively feeble; experiencing an urgent desire to empty the bowels, she seated herself on the vessel, and made some straining efforts, when she fainted away; the attendants immediately placed her in a horizontal position, and they had scarcely time to get her into bed before she died. Nothing whatever was detected at the autopsical examination that could give a clue to the cause of this sudden death.

f *Exhaustion.*—When the patients are exhausted by an antecedent disease, whether acute or chronic, and when frequent and long-continued vomiting has affected nutrition greatly, and diminished the strength considerably, I should think it prudent not to allow the expulsive stage to continue longer than an hour or two. The efforts required to terminate the second stage, might, in some cases, exhaust the remaining strength, and bring on immediately after delivery a rapidly fatal collapse.

[g. *Pulmonary and Subcutaneous Emphysema.*—In consequence of the forcible compression of the air contained in the respiratory organs during the violent efforts of labor, rupture of the air-passages sometimes, though rarely, occurs, and gives rise to emphysema.

Should the rupture occur in the larynx or trachea, the emphysematous swelling will appear in the neck, to which it is sometimes restricted, though at others it invades both the face and the head. Still more rarely, it spreads to the body, where it occasionally acquires an enormous size. When limited in extent, the emphysema is, so to speak, attended with no inconvenience, but when it invades the body and the limbs, may occasion oppression and threaten suffocation. I have, however, no case to report of death occurring under these circumstances, for recovery gradually takes place by absorption of the air.

When the pulmonary vesicles give way, it is, doubtless, possible for the emphysema to reach the mediastinum, and from thence spread to the neck, but the air may also diffuse itself through the intervesicular, interlobular, and subpleural cellular tissue, and thus invade both lungs, without, however, passing beyond them. In such a case, emphysema may prove rapidly fatal, as shown by a remarkable instance published by M. Depaul. The patient in question had never during life a single symptom to excite a suspicion of the existence of the slightest lesion of the respiratory organs. During the greater part of her second labor, the breathing was easy and free, but the latter stages were rendered difficult by deformity of the inferior strait and large size of the head of the child. During the powerful expulsive efforts to which the patient gave way, her respiration suddenly became short and difficult, and the pulse small and extremely rapid. M. Depaul immediately delivered her by the forceps, but the symptoms grew worse until ended by death, forty-six hours after delivery. The autopsy revealed emphysema of the cellular tissue of both lungs.

Emphysema usually demands no special treatment; should the air invade the body and impede respiration, punctures should be made with a lancet, or even incisions through the skin. As in all cases it is to be apprehended that the affection will continue to spread, should the labor be prolonged, delivery should be hastened by the use of the forceps.

H. *Fractures of the Sternum.*—It is possible for the sternum to be fractured by muscular effort during labor. Chaussier saw two cases of the kind, both occurring during the first labors of women of from twenty-four to twenty-five years of age. At the moment the fracture took place, both the patients had the head thrown back as far as possible, at the same time drawing strongly with the arms and pressing with the feet. These fractures are simple, transverse, and separate the sternum into two pieces. The symptoms are, first, sharp pain at the point of fracture; and one of Chaussier's patients heard at the same time a crack which caused her to exclaim that she had probably broken something in her breast. With this there is sometimes abnormal mobility, and occasionally even crepitation. The diagnosis is, however, often far from easy. In one of Chaussier's cases, the fracture was not discovered until the tenth day. The treatment is simply a bandage applied around the chest to prevent motion.]

CHAPTER XIV.

DYSTOCIA OCCASIONED BY THE FŒTAL APPENDAGES.

THE membranes which form the walls of the ovum, the umbilical cord, the placenta, and the amniotic fluid, may all, through some departure from the normal condition, give rise to dystocia. Thus, unusual strength of the membranes may retard labor and necessitate their artificial rupture. (See p. 396.) On the other hand, they may be too thin or tender, and thus dispose to a premature discharge of the waters, which is not desirable. (See p. 296.) Excess of amniotic fluid forms one of the true diseases of pregnancy (see p. 541), and sometimes causes the labor to be very tedious (see p. 607). Finally, by its insertion upon the neck of the uterus, the placenta is but too often the cause of alarming hemorrhage. (See p. 754, *et seq.*) All these causes of difficult labor, very different as they are seen to be, have already been studied in the various articles referred to, and will receive no further attention; but to complete the subject of dystocia occasioned by the fœtal appendages, we have, lastly, to treat of prolapsus and shortness of the umbilical cord.

ARTICLE I.

PROLAPSUS, OR FALLING OF THE CORD.

The descent of the cord is quite a rare accident, since Madame Lachapelle states that she met with it but forty-one times in fifteen thousand six hundred and fifty-two labors; but it is probable, as she appears to think herself, that there has been an error in the registers, for the statements given by other observers show a much larger proportion. I shall only bring forward the account of Michaelis, who says that he had detected fifty-four cases of falling of the cord in two thousand and four hundred labors; and a summary, by Dr. Churchill, of ninety thousand nine hundred and eighty-three labors, in which there were three hundred and twenty-two cases of prolapsus, or one in two hundred and eighty-two, nearly. (Rigby.)

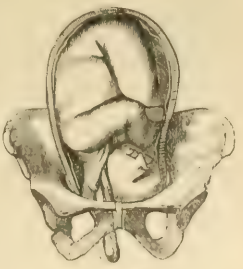
The falling of the cord is most frequently observed in vertex presentations, which circumstance is readily explained by the comparative rarity of the others. But, in proportion to the relative numbers, it is more

frequent in breech presentations, and far more so in those of the trunk. In thirty-three cases of labor at term accompanied by this accident, Mauriceau observed seventeen presentations of the vertex, one of the face, one of the feet, nine of the hand or arm, three of one hand and one foot, one of the breech and one hand, and one of the head and one hand. In sixteen thousand six hundred and fifty-two deliveries, Dr. Collins has met with ninety-seven cases of prolapsus, namely, twelve times in twin pregnancies (and in seven of these twelve the prolapsed cord belonged to the second child); nine times in footling presentations; twice in those of the breech; four times with the shoulder; seven times when an escape of the hand complicated a head presentation; seven with a dead and putrefied fœtus; and lastly, in three cases the delivery took place before term; that is, twice at seven and once at eight months; and the others were simple vertex presentations.

Certain authors have endeavored to draw a line of distinction between the prolapsus or presentation and the falling, properly so called; designating, under the former title, those cases in which the cord, though found in the uterine orifice, is still retained in the amniotic sac, on whose lower part it lies; and, under the latter, those cases only in which it hangs down in the vagina, or even protrudes beyond the vulva, after the rupture of the membranes; but such a distinction is puerile, as it can only serve to designate two degrees of the same accident.

A. The *causes* that may be considered as predisposing to a prolapsus are: the unusual length of the cord itself, a large amount of water, deformities of the pelvis, an obliquity of the womb, and those malpositions of the child which prevent the presenting part from engaging readily in the superior strait and excavation. The attachment of the placenta near the os uteri also predisposes to a prolapsus, by keeping the cord just at the uterine orifice. With regard to the determining causes, we must place in the first rank a sudden rupture of the membranes, and the rapid escape of a large quantity of water, which generally sweeps along with it a fold of the cord. Consequently, when the neck of the womb is almost effaced, the bag of waters very prominent, and the head not engaged in the excavation, we must carefully avoid rupturing the membranes during a pain, for the gush of liquid, which then escapes with considerable force, nearly always carries along a loop of the cord, which thus precedes the presenting part. (Martin, of Lyons, *Comptes Rendus*, page 13.) To these causes, let us further add the descent of a hand or a foot, which seems to act as a guide, as it were, for the cord, and to open the way for it.

Fig. 112.



The right posterior occipito-iliac position, complicated by a fading of the cord.

B. The *signs* whereby this accident can be recognized, vary according to whether the membranes are ruptured or are still intact. In the latter case,

the diagnosis is quite difficult; nevertheless, we can often detect something like a soft, small cord, through the portion of the membranes covering the os uteri, and slipping away before the least pressure, but the true nature of which can only be determined by the rapid pulsations in it. The rapidity of these, which Madame Lachapelle aptly compares to the ticking of a watch, can alone enable us to distinguish them from some other pulsations produced by certain arteries that occasionally ramify in the substance of the neck, and which are synchronous with the mother's pulse. This error would be more difficult to avoid, should the finger, when applied on the membranes, encounter one of the arterial ramifications of the cord, which, as in the cases described by Beneckiser (see *Umbilical Cord*), may spread out on the membranes before entering into the proper tissue of the placenta. The size and the mobility of the prolapsed cord would also aid in making out the diagnosis. On the other hand, the thickness and the spongy condition of the membranes, the inequalities they occasionally present, and the folds of the child's scalp, might perhaps lead us to suspect a falling of the cord, if the clearly ascertained absence of pulsation did not promptly rectify the mistake. But after the rupture of the membranes all the difficulty disappears, for then the cord hangs down in the vagina, and often escapes beyond the vulva, and therefore may always be readily explored.

The two portions of the prolapsed fold are not uniform in their relations with each other; most generally, they touch, or are simply approximated together; and sometimes they are separated by the whole thickness of the presenting part. Nor is the fold more regular in its length; at times it only embraces the head, holding it like a sling; while at others it appears externally between the woman's thighs, though most usually it is lodged in the vagina, or at least only reaches the exterior in the latter stages of the labor. It has, in some very rare instances, been known to go up again, and thus become reduced spontaneously. (Guillemot.) As a general rule, it is situated just in front of one of the sacro-iliac symphyses, or behind the ilio-pectineal eminence.

A prolapsus, therefore, can always be detected; but it is much more difficult, though at the same time it is highly important to determine, after the exploration, whether the child is living or not. A momentary disappearance of the pulsations is not a sufficient sign; for it not unfrequently happens that the throbbing ceases in it during the pain, because the cord is then strongly compressed, but it reappears again as soon as the pain is over. This want of circulation in the vessels of the cord may continue for five or ten minutes, and it has even been known to last for a quarter of an hour, without necessarily terminating in death. It is therefore during the interval alone that any researches of this nature should be made, and the child's death can only be determined with certainty when this exploration, repeated several times under like conditions, shall have always furnished a negative result. A cold, soft, withered, and greenish cord doubtless belongs, in most cases, to a dead child, but this is not always true; and, on the other hand, as death may result very promptly from compression of the cord, the latter may still be warm and fresh, though the fœtus be dead.

[*Per contra*, one might fancy that he detected pulsations in the cord, even though the fœtus had been long dead. This is due to the fact that the finger in contact

with the cord sometimes perceives very clearly an undulation of the blood within it which distends its vessels and raises the finger. It will, however, soon be observed that the phenomenon is coincident with the beginning of a pain, and is caused by the reflux of blood then expelled from the placenta. There is, consequently, no occasion for mistaking this undulatory motion for the true fœtal pulsation.]

c. *Prognosis.*—The falling of the cord is only serious as regards the fœtus; but to it the danger is imminent, since death itself may result in consequence in the course of a few minutes. Thus, in three hundred and fifty-five cases collected by Churchill, two hundred and twenty children, or nearly two-thirds, died; though it is worthy of remark that in many of these cases, the mothers were not transported to the hospital until some time after the descent of the cord, and when its pulsations had entirely ceased.

The compression of the cord, and the consequent interruption of the fœto-placental circulation, is the principal if not the only cause of death; though certain authors, among whom I can enumerate Velpeau and Guillemot, suppose that, when the cord protrudes beyond the vulva, the blood may lose its fluidity in consequence of being chilled by the external temperature, perhaps may even coagulate, and that the delay in the circulation thereby produced, combining its influence with that of a slight pressure, completely interrupts the current which, up to that moment, had only been retarded; Delamotte, Baudelocque, and Madame Lachapelle, do not admit this effect of the cold. "For I have seen," says this illustrious midwife, "the cord hang out of the vulva for several hours together without the fœtus suffering therefrom in any wise, because there was no compression; and this, in some of the cases, notwithstanding the patients had come a greater or less distance, either on foot or in some vehicle, from their residences to our hospital."

But whatever view may be adopted, it is still to a compression of the cord that we must attribute the greatest share in the production of the child's death; and under this aspect, its position, when prolapsed, will greatly modify the prognosis. The points where it is least exposed to compression are just in front of the sacro-iliac symphyses; and, as M. Naegèle has justly remarked, the frequency of the vertex positions in which the occipito-frontal diameter corresponds to the left oblique one of the pelvis, renders the danger in general much less if the fold of the cord happens to be placed behind and to the left.

The influence of this compression has been variously interpreted. According to some, the child will die from apoplexy in consequence of an excess of blood, which continues to arrive by the vein, but can no longer return to the placenta through the umbilical arteries; agreeably to others, the circulation will be free in the arteries, the vein alone being obliterated, and then the fœtus will die from anæmia or syncope. But it is only necessary to examine the intertwining exhibited by the vessels of the cord, to become convinced that this partial compression cannot exist except as an accidental circumstance, and that, as a general rule, the current must be interrupted in all three vessels at the same time. The most plausible opinion, and we believe the only one admissible, is that asphyxia is the sole cause of death:

for, as we have elsewhere stated, the placenta is the only organ of hematosis for the child up to the moment when the pulmonary respiration is established; and, therefore, if the circulation in the cord is interrupted by any compression before birth, the blood of the fœtus can no longer derive the elements necessary for its renovation by its mediate contact with that of the mother in the placenta; and from that moment the child finds itself placed in the same conditions as an adult deprived of respirable air, and, like him, dies asphyxiated.

In most cases, it is not until after the membranes are ruptured that the descent of the cord exposes it to a sufficient degree of compression to compromise the infant's life. Indeed, if we might judge from some observations of Madame Lachapelle, the pressure which it undergoes is never great enough to obliterate the umbilical vessels, so long as the head is not engaged in the superior strait. For our own part, we are inclined to believe that the simple pressure of the head on the cord may be so considerable as to interrupt the fœto-placental circulation, even before the discharge of the amniotic waters. D'Outrepont relates two cases which confirm this view; and the numerous instances in which we find the meconium mixed in large quantities with the liquor amnii at the time of the rupture of the membranes, can only be explained, in our estimation, by a momentary compression of the umbilical cord.

D. *Treatment.*—As regards the treatment, the delivery might be left to the powers of nature: 1, whenever there is a certainty that the child is dead; 2, when, though the infant be living, the membranes are only ruptured as the head becomes firmly engaged in the excavation, and when, from the fact of the contractions being energetic, there is every reason to hope that they alone will be sufficient to terminate the labor promptly; which, in fact, usually occurs in women who have a non-resistant perineum, from having previously borne children; and, 3, where the head is small, the pelvis large, and the cord situated in front of one of the sacro-iliac symphyses; for then it is only necessary to return the cord into the vagina to protect it from contact with the air. But, notwithstanding these favorable conditions, it will still be necessary to watch the state of the cord attentively, and to apply the forceps as soon as the pulsations are found to grow weaker or to become intermittent.

Under all other circumstances, the intervention of art will be indispensable. Thus, where the presentation is such as to render a natural delivery impossible, or, even if possible, where the expulsion of the fœtus would require a long and painful labor, the forceps should be applied or the pelvic version be resorted to without delay. The former operation will be the only one practicable in a vertex or face presentation, supposing both to be firmly engaged in the excavation, and that the previous attempts at reduction had proved ineffectual. It is generally thought that turning by the feet should be preferred whenever the part is not too strongly engaged.

In a presentation of the breech, the operator ought to search for the feet, if the presenting part be still above the superior strait, or bring down the groins with the blunt hook, if it has descended into the excavation.

In a presentation of the vertex or face, where these parts have not as yet

engaged in the excavation, we should first endeavor to reduce the cord. Several plans have been recommended for this reduction; but the manual method, the oldest of all, is still entitled to the preference, notwithstanding the great number of instruments that have been proposed for the purpose. The operator can always proceed with greater facility behind, and on the sides of the pelvis, close to the sacro-iliac symphysis; the right hand will be used when the cord is to the left, and the left one if it is at the mother's right. Where the loop is small, it will only be necessary to push it up by the middle; but in the contrary case, it is to be gathered up and pressed back little by little, just as the taxis is usually performed in the reduction of hernia. But merely pushing the cord back into the uterus will not be sufficient to protect it, and it must be carried up above the superior strait, and the hand retained in the vagina during several contractions to prevent it from falling down. Some accoucheurs, fearing that it could not be kept in position, notwithstanding this plan, have directed the introduction of the whole hand into the womb, with a view of placing the cord on one of the child's limbs; though this precaution is useless in most cases, it would certainly be preferable to the pelvic version, says M. Guillemot, where there is a slight contraction of the pelvis.

T. Gaillard Thomas, in an article upon "Postural Treatment of Prolapsed Funis," Trans. of the New York Academy of Med., advised the knee-chest position in order to reverse the direction of the uterine axis and cause the cord to slip back by its own weight. The patient is placed upon her hands and knees with the hips elevated. By this means the pressure is removed, and the other methods advised above may be used to better advantage.

But the instrumental method must be attempted, where the smallness of the external parts, or an undilated os uteri, &c., render the introduction of the hand very difficult or impracticable. Some of the various instruments proposed for this purpose might then be used; perhaps M. Dudan's, recommended by M. Guillemot, is one of the simplest and best: He takes a gum-elastic (male) catheter, of the size No. 9, armed with its stylet, and having a piece of narrow ribbon introduced into the last eye of the catheter, which is retained there by the extremity of the stylet; the ribbon is next attached to the umbilical cord, without drawing it too tight. If the loop of the latter is short, it is applied near the middle, but if long, the cord is to be first doubled up; being thus secured, the extremity of the instrument carrying the cord is then directed along the hand that had previously been introduced into the vagina, and placed within the uterine cavity. The hand in the vagina assists the return of the cord by preventing it from slipping from the noose of the ribbon.

When the reduction is completed, we must wait until the head becomes engaged, before withdrawing the instrument; then the stylet is first removed and afterwards the catheter.

[In a case of this kind I used another manœuvre, which proved very successful. The patient was a young woman in her first labor, which had made little progress, dilatation being incomplete, when the waters were discharged, carrying with them

a fold of the cord. The head presented, and the dilatation was too imperfect to think of carrying the cord with the hand to the fundus of the uterus. I made several attempts to return the prolapsed loop in the same way that one tries to reduce a hernia, and to get it above the head; but it always slipped down again. To prevent it from being compressed, I passed my entire hand into the vagina, slipped two fingers into the orifice between the head and the margin of the superior strait, and thus kept them alongside of the cord which they protected, and of whose pulsations they were cognizant. My fingers, therefore, had to bear the pressure at each pain; fortunately, the labor progressed rapidly, and dilatation was completed in about an hour. I then withdrew the hand, applied the forceps quickly, and delivered a living child.]

Where the reduction proves to be impossible, the pelvic version, if the head is high up, and the forceps, if it is already engaged, are the only resources left us. But whenever version is resorted to, it is necessary to carry up the cord into the uterus, whilst searching after the feet (Boër), lest it be compressed either by the arm of the accoucheur, or somewhat later by the hips and the trunk of the child.

ARTICLE II.

OF SHORTNESS OF THE CORD.

The cord may be very short naturally; and, as elsewhere stated, it has been known not to exceed four or five inches in length; but such cases are very rare; most generally its brevity is accidental, that is, results from the numerous turns made around the body, limbs, or neck of the child. The formation of these circular loops is favored by an unusual length of the cord.

The latter, in a case reported by Baudelocque, measured fifty-nine inches, and made seven folds around the infant's neck; and Schneider saw a cord that measured three and a quarter yards (three metres), and made six turns on the neck. Nothing is more common than to find children whose bodies and necks are encircled by two or three of these folds.

An accidental shortening of the cord may render the labor difficult, either by retarding its progress, or by making it absolutely impossible, or by causing the death of the fœtus. This latter circumstance may result from the constriction undergone by the vessels of the neck, when the cord is tightly wound around this part; or it may be owing to an interruption of the circulation in the umbilical vessels, produced solely from the stricture of the cord itself, where it closely encircles a limb;[1] again, these two causes may act simultaneously, and determine the child's death much more speedily.

[1] This constriction is sometimes exceedingly great, and authors have certainly erred in denying that it could ever be such as to strangle the fœtus. Besides, it is not only at the time of labor, and as a consequence of the tractions produced by the expulsory efforts of the womb, that an effect of this kind is observed, but these turns may also form during the pregnancy, and their constriction may then be extensive enough to occasion death. Thus, M. Monod met with a fœtus upon whose limbs they had left very deep marks, not merely in the soft parts, but even on the bones themselves. The infant's neck often exhibits undoubted traces of them, and in one case examined by M. Taxil, there were three circular folds around the neck, which was so diminished in size that its diameter did not exceed two or three lines (four millimeters.) It is to such circular turns that M. Montgomery refers those spontaneous amputations, which M. Richer and some others have supposed were dependent on a gangrene of the part.

These turns of the cord around some part of the body are of quite common occurrence. Mayer states, in his inaugural thesis, that out of 3,587 deliveries which took place between 1828 and 1841, they were present in 685 cases. Five hundred and sixty-four of the children were born alive, seventy-two were in a state of asphyxia, but recovered under proper treatment, and forty-nine were dead. In 18 of the latter cases, however, the death could not be regarded as due to the wrapping of the cord.

[Mr. C. Devilliers, who wrote a very complete paper upon shortness of the umbilical cord, thinks that a short cord may be known to exist at the commencement of labor by the following signs: "Continuance of the fundus of the womb high up in the epigastric region until the orifice is widely dilated, even though the pelvis be well formed, the child normal as regards position and size, the waters in medium quantity, and the lower segment of the uterus altered as is usual during gestation.

"Agitation of the fœtus followed almost immediately by permanent diminution of its motions at a period not very remote from the term of gestation, when the shortening is accidental: slight motion during a part of gestation, especially near its close, when the shortness is natural and simple; a diminution and difficulty in the movements which coincides with the preceding symptoms." (*Devilliers*, Paris, 1862.)]

Generally, the delay in the labor, caused by the shortness of the cord, is not usually manifested until the stage of expulsion, properly so called, begins; and then, as M. Guillemot justly remarks, the attendant phenomena will vary according to the point of attachment of the placenta. When inserted at the fundus, it, like the wall to which it is attached, seems to descend at each contraction, and approach the os uteri, but after the pain it retreats with the fundus to its original elevation. In ordinary cases, the hand can detect this fact by being merely placed over the uterine tumor; but when a very short cord is forcibly stretched between the placenta and some part of the child's body, a particular phenomenon can be recognized by the touch; that is, the finger, when applied on the head, finds it advancing during the pain, and retreating as soon as it is over, because at this moment the fundus of the womb, which had been depressed by the contraction, regains its primitive position, and draws after it the placenta, cord, and fœtus. But this sign will evidently be wanting where the after-birth is attached to the lateral parts of the uterus.

We have met with a case in which the unusual shortness of the cord, which was only nine inches in length, certainly detained the head above the superior strait for fifteen hours after the rupture of the ovum and the entire dilatation of the os uteri; and we can affirm that, notwithstanding the closest attention, we were unable to discover any of the signs given by former authors; though it is true that the rapidity in the delivery of the after-birth, after the child's expulsion, did not permit us to ascertain at what point the placenta was inserted.

Before the membranes are ruptured, this phenomenon might be confounded with the successive elevation and descent of the head that takes place in nearly every case of labor. But to avoid such an error, it will suffice to remark, that the ascent of the head then takes place during the contraction, and it only falls back after the pain is over; being just the contrary of what

occurs when the cord is dragged upon. Finally, in ordinary cases, when the head engages at the perineal strait, it is found to project during the contraction, and to retreat immediately after it from the reaction of the perineum, which, after having been forcibly distended during the pain, retracts strongly, and thereby presses it back into the vagina. But, as Delamotte and Guillemot have remarked, whenever these movements of progression and repulsion merely depend on the elasticity of the perineum, "they are only present: 1. When the head engages at the inferior strait, and then they are the less evident as the pains are more rapid and more energetic; while, on the contrary, they commence much sooner when dependent on a short cord, and become more sensible as the head approaches the vulva, because the tension on the cord is then increased; besides which, they are persistent, whatever may be the strength of the contractions, and are the more marked as the latter become stronger.

"2. On the other hand, when the placenta is attached to the lateral walls of the womb, these movements are very obscure, and the diagnosis is quite difficult. In both cases, the shortness of the cord is accompanied by pain, which is felt at the point of attachment of the placenta, particularly in the latter moments of the parturition; this pain is a sensation of dragging, or tearing, which commonly coincides with the movements of progression and repulsion; and which might be compared to those felt by the patient when an attempt is made to remove the after-birth, before its complete separation." (Guillemot.) Sometimes, says M. Devilliers, there is a sudden repression or suspension of the contraction of the womb just when it ought to be strongest.

According to M. Nægèle, Sen., these circular turns may be discovered by auscultation during pregnancy or labor, by the existence of a bellows murmur accompanying the fœtal pulsations. I agree with M. Danyau in the opinion, that further research is required to establish the absolute value of this new means of diagnosis. (See *Bellows Murmur.*)

The reader will now understand that a shortening of the cord may retard the progress of the head, whether it be still at the superior strait, or whether it has cleared the excavation and is on the point of engaging at the inferior strait. We ought to add that even the shoulders may be arrested, and the delivery of the trunk be prevented after the complete disengagement of the head, by the circular turns which are occasionally made around the child's neck by too short a cord. We were witnesses to a case of this kind, that occurred at the Clinique, in 1838, where a division of the cord, which was not made until two hours after the escape of the head, could alone effect a termination of the labor: the fœtus was born dead. Delamotte (page 305) furnishes an instance precisely similar to this.

The intervention of art is therefore sometimes necessary, although it often happens that the trunk is delivered spontaneously. However, the mechanism is not the same in cases of natural and of accidental shortening; for, in those of normal brevity, the head may remain applied against the vulva after its disengagement, without much inconvenience, and the extra-uterine respiration may be established and kept up. In a short time, the womb gradually contracts on the parts of the child that it still contains, and, being itself forced along by the bearing-down efforts of the patient, it sinks into

the vagina, and, by thus approaching the vulvar orifice, may easily force the trunk to the exterior. Occasionally, this descent of the womb does not occur at all, or else is not sufficient to permit the escape of the child; and then a rupture of the cord, or a detachment of the placenta, can alone enable the uterine efforts to complete the delivery. Thus, in a case of the kind reported by Malgouyré, the discharge of the waters, the delivery of the child, and the expulsion of the after-birth, all occurred simultaneously: and the following instance is related by Dr. Rigby. After two or three hours of severe pains, the fœtus was suddenly expelled, and the cord was broken at about two inches from the umbilicus, so that, when the midwife attempted to deliver the after-birth, she could not find the other end of the cord; but, having introduced her hand into the womb, she felt and extracted the placenta; and it was then discovered that the cord had been lacerated at its point of insertion.

In labors complicated by an accidental shortening of the cord, the child's head passes beyond the vagina, and retains its position there until a renewal of the pain; and when the latter comes on, the head is observed to pass to the sides of the vulva, whilst the shoulders, back, and breech successively disengage. This expulsion is sometimes effected so rapidly that it is difficult to follow it; but, if it be delayed in the least, a prompt intervention is requisite, for, as elsewhere stated, the compression made by the folds around the neck may speedily prove fatal to the child.

In breech presentations, the labor usually terminates in the following manner, when abandoned to itself; the nates, after having been forced down to the vulva by the uterine contractions, turn up toward the side where the cord is situated, and then the trunk descends, becoming flexed on itself in the passage; so that, by the time the head reaches the excavation, the body of the child forms a curve, whose concavity corresponds very nearly to the symphysis pubis.

Independently of the delay that it may cause in the progress of parturition, and the consequent danger to the fœtus, a shortening of the cord may produce other and serious accidents to the mother. It is to this circumstance particularly, that we must in most cases attribute the rupture of the cord, and the premature separation of the placenta, points to which we shall return when treating of uterine hemorrhage. The danger of these accidents will vary greatly with the period of their occurrence; thus, at the commencement of labor, the bleeding thereby occasioned might seriously compromise the lives of both mother and child, if the resources of our art were not promptly interposed. But if they do not occur until the moment when the head is ready to clear the vulvar orifice, they may rather be considered in a favorable light, for, as we have just seen, this is one of the means that nature employs for terminating the delivery.

Again, if the cord and the adhesions of the placenta should obstinately resist, it is possible that an inversion, or at least a depression of the uterus, might be the immediate consequence of the child's expulsion. The inversion occurs towards the end of the labor, when the distention of the parts obliges the woman to bear down: and as she still continues to strain, after the cessation of all uterine contractions, the relaxed womb yields the

more readily to the action of the abdominal muscles, which tend to depress its fundus, because the short umbilical cord drags the uterine wall, where the placenta is attached, in the same direction.

Treatment.—The disastrous consequences that may result from a shortening of the cord present different indications for treatment, according to the stage of the labor at which its existence is detected. When the membranes are still unbroken, if the os uteri be freely dilated, the contractions energetic, and there is every reason to suppose, from the signs before given, that a dragging on the cord is the cause of the delay, they should be ruptured at once; for, after the waters have escaped, the uterus will contract, its fundus will approach the cervix, and the cord, being no longer dragged upon, will permit the head to descend into the excavation. If the head be at the inferior strait, at the time when the alternate movements of elevation and descent begin to manifest themselves during and after the contraction, the forceps should be applied. But where the head has only the resistance of the soft parts to overcome, we must be content with preventing it from remounting in the excavation after each pain, as much as possible; for that purpose we must apply the hand strongly on the perineum, and while supporting it, favor the escape of the head by pressing it up in such a way as to aid its process of extension or disengagement. It would also be advisable to have the hypogastrium compressed at the same time by an assistant, in order to prevent the uterus from ascending during the interval between the pains. Lastly, after the head is delivered, the accoucheur should immediately loosen the turns of the cord around the neck, and slip them over it; and where these folds are so tight as to resist the tractions made with that object, they should be divided, but it is not requisite to apply the ligature to the umbilical extremity of the cord at once. In most cases, indeed, it is necessary to allow this to bleed a little after the birth, in order to relieve the apoplectic state of the fœtus; for, by applying the ligature too soon, we would be deprived of this resource. Nevertheless, where the expulsion is unusually delayed, the fœtal end of the cord, known by the jets of blood which issue from it, will have to be slightly pinched between the two fingers to prevent hemorrhage.

Dragging of the cord entwined around the trunk or limbs is not at all unfrequent in natural labors by the breech, and when pelvic version has been effected. It is to be remedied by making moderate tractions on its placental extremity, and if these are not sufficient, it should be divided, and the labor terminated as speedily as possible. The same precepts are applicable in all cases where the brevity of the cord is natural; and if the accoucheur is obliged to carry his hand up into the womb to ascertain the nature of the obstacle, he should take advantage of the occasion to effect pelvic version, and to draw down the child until the base of its chest appears at the vulva; then the cord is to be cut and tied, or else compressed with the fingers, and the extraction of the fœtus completed at once.

It is advisable to introduce the hand again into the uterus after the placenta is delivered, to ascertain that the fundus of the organ is neither depressed nor inverted.

[CHAPTER XV.

OF DYSTOCIA DUE TO THE FŒTUS.

In order that delivery should be effected spontaneously and without danger, it is not only necessary that the mother should be well formed and the labor uncomplicated by any of the accidents which have been already studied, but the size of the fœtus and the conformation of the different parts should have a proper relation with the canal to be traversed. It ought also to present by one of the extremities of its long axis, which should be properly situated in regard to the pelvis. The fœtus at full term may also be diseased, or so deformed as to have its size sensibly increased.

In the present chapter, therefore, we have to consider the indications arising from unusual size, wrong presentations and positions, diseases and monstrosities of the fœtus.

ARTICLE I.

UNUSUAL SIZE OF THE FŒTUS.

Whether the pelvis be contracted or the size of the fœtus greater than usual, the relative proportions required for an easy delivery no longer exist, and the labor is difficult.

Very rarely does the size of the fœtus exceed a certain limit and render delivery impossible.

The first chapter, however, of Dugès' paper is devoted to cases of this kind, though he has met with very few in his own practice. One instance of the kind has been already mentioned in the present work. (See p. 216.)

There can be no doubt that labor may be rendered longer and more painful by unusual size of the child; still, if all the other conditions are favorable, delivery will most probably be effected by the unaided efforts of nature. "It is more particularly when it becomes necessary to turn a very large child that the greatest difficulties are liable to be encountered, and that especial care should be taken to avoid the crossing of the arms back of the neck, to turn the face first toward one of the sides of the pelvis and then toward the sacrum, and also to depress the chin so as to bring the sub-occipito-bregmatic and bi-parietal diameters parallel to those of the pelvic canal and of the external genital organs." (Dugès.)

The unusual size may not be general, but confined to some one part of the fœtus; therefore, to complete what has been already said, we shall treat briefly of unusual size of the head and shoulders.

Unusual Size of the Head.—To this cause of dystocia, our colleague and friend, Dr. Joulin, Adjunct Professor of the Faculty of Medicine, at Paris, devoted a long chapter of his thesis for the *Concours*. According to him, the Germans admit that trouble may be due to the size of the head alone, besides which they also call attention to a peculiarity of the ossification, little known in France, which adds to the difficulty of the situation; viz., the development of ossa wormiana in the fontanelles, causing their solidification.

It is very hard to determine what ought to be done in cases of this kind; it is almost impossible to become aware of the size of the child whilst it is still within the womb, so that the practitioner who finds the progress of the case arrested in an apparently well-formed pelvis, will very probably decide upon active interference before the true cause of the delay is detected, and apply the forceps or cephalotribe, according to the amount of difficulty when the size of the head shall present [illegible] extraction. (Joulin.)

Unusual Size of the Shoulders.—Labor may also be rendered difficult by the

great length of the bi-acromial diameter. This cause of dystocia, which had been suspected for a long time, was made by Levret, under the title of impaction of the shoulders, the subject of very remarkable researches which, of themselves, ought to have prevented its falling into oblivion. In our own time it has been again asserted and placed beyond doubt by M. Jacquemier, who wrote an excellent paper upon it. It were hardly necessary to say that we have to do less with the size of the shoulders proper than with that of the chest; still, on account of their situation and projection, the shoulders are included in the impeding part. The shoulders and upper part of the chest, says M. Jacquemier, being retained at the entrance of the pelvis after having obstructed the passage of the head through the external genital parts, again hinder the passage of the trunk after they have got to the bottom of the pelvic cavity. But it may also happen that when the hindrance to the exit of the head occasioned by the presence of the shoulders at the entrance of the pelvis has been at last overcome, the remainder of the body shall pass without trouble. Still, the opposite may occur, and the difficulty occasioned by the shoulders only declare itself after the head has been born.

I might add three cases of my own to those mentioned by M. Jacquemier, having been called upon to terminate the delivery under the following circumstances: in all the head had been born, but although traction was used, it was found impossible to extract the trunk. My own efforts were more successful, though I must acknowledge that I had to employ considerable force.

It is important to recognize this cause of dystocia and overcome it quickly, inasmuch as it leads rapidly to the death of the child. When the shoulders, continues M. Jacquemier, are arrested at the superior strait and thus keep the head at the bottom of the cavity of the pelvis, or when they are more or less engaged in the inferior strait, as the difficulty is due to the size of the chest rather than to the position of the shoulders, there is no indication for endeavoring to alter the position of the latter, but the forceps should be applied. If this instrument prove ineffectual, what is next to be done? As soon as the fœtus has ceased to live, or its chances of life are rendered highly improbable, the mother's life ought not to be endangered by too long expectation. Craniotomy should be performed, followed by cephalotripsy; in short, the size of the head ought to be so lessened as to enable the accoucheur to pass his hand deeply, seize the arms of the child and bring them down, after which, by drawing upon them, the trunk can be delivered.

When the great size of the shoulders arrests delivery only after the head has been born, what ought to be done? At first it would seem reasonable to draw somewhat upon the head, and although it might answer in simple cases, it would be useless provided the difficulty were considerable. Indeed, there is risk of tearing off the head, for it has often been done. Therefore it were much better to work two fingers into one of the axillæ and draw the shoulders down; but if necessary, there should be no hesitation in seizing the root of the arm with the entire hand, for thus only can it exert its full power.

Tractions upon the axillæ are a step in the process which consists in the successive disengagement of the arms, followed by tractions upon them in order to deliver the trunk. This latter method is preferred by M. Jacquemier as being the most efficacious, because it has the advantage not only of affording a solid bearing, but of removing from the chest the thickness of the arms and the abrupt projections formed by the stumps of the shoulders. (Jacquemier.)]

ARTICLE II.

IRREGULAR OR COMPLICATED PRESENTATIONS AND POSITIONS: ANOMALIES IN THE MECHANISM OF LABOR.

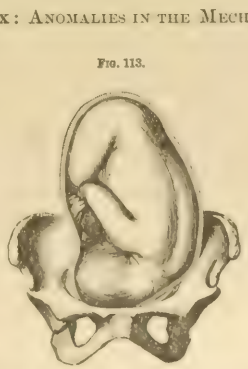
The ancients applied the term malposition to all those cases in which the top of the head did not correspond to the os uteri. But, as we have already demonstrated, the labor nearly always terminates favorably, both for the mother and child, in the presentations of the face and breech, though it is a little more difficult than usual; and experience has even proved that it is barely possible in those of the trunk. Nevertheless the first three presentations offer certain anomalies and irregularities, that may at times render the labor difficult, and require the intervention of art; for, although the presentations of the vertex, face, and breech are usually free and regular, yet they may be irregular or inclined. But these last so rarely constitute an obstacle to the spontaneous termination of the labor, that we have not hesitated to include them in the description, heretofore given, of the mechanism of natural labor. In fact, the only modification they determine in this mechanism is that the head, in clearing the superior strait or traversing the excavation, undergoes a movement of correction, whereby the occipito-frontal or the sub-occipito-bregmatic circumference becomes parallel to the plane of the strait. But this movement is necessary; for, if the head exhibits its normal size, the delivery is only possible under that condition,[1] and, when it does not take place, the resources of art are indispensable. Certain anomalies, capable of interfering with the expulsion, may also take place in the movements of the head. We must now ascertain what are the indications for treatment presented in these particular cases.

§ 1. Inclined Positions of the Vertex: Anomalies in the Mechanism of Labor.

Under this title we include all those positions that have been described by Baudelocque as the positions of the sides of the head, of the ears, the temples, and the occiput; the former of which is recognized by the presence of an ear, the angle of the jaw, or by the parietal protuberance; while a presentation of the occiput is detected by the triangular form of the posterior fontanelle, by the lambdoid sutures, and the vicinity of the neck.

In general, when an inclination of this kind is detected at the onset of labor, or shortly after the membranes are ruptured, there is nothing to be done; for it is well known that, in far the greater number of cases, the conversion is effected sponta-

Fig. 113.



The left sacro-cotyloid position strongly inclined on its posterior parietal region.

[1] However, we have known this conversion of an inclined vertex position into a free one to occur at the inferior strait in a woman with her first child: the head was placed

neously; but, if the head still retains its primitive position for five, six, seven, or eight hours after the discharge of the waters, and its descent is thereby impeded, we must attempt an artificial correction. It is possible to accomplish this with the hand alone, which is always to be tried before resorting to an introduction of the lever or forceps; and it is unnecessary to add that any obliquity of the uterus, should it exist, must first be remedied. As a general rule, that hand should be used whose palmar face would grasp the vertex the most readily; and, when introduced into the womb (see *Version*), it grasps the occiput so as to draw upon it, after having first removed it from the iliac fossa; whilst considerable pressure is made with the other hand over the hypogastric region, in order to force the head to descend. When the correction cannot be effected by the hand alone, most accoucheurs recommend the employment of the lever; but we should decidedly prefer having recourse to the forceps, the blades of which would act at first as a lever in rectifying the head, and then, by their traction, the labor could be terminated almost immediately. Because, where seven or eight hours have been spent (according to our precept) in the vain hope that the powers of nature would be adequate to rectify the inclination; and where the operator has unsuccessfully attempted to produce the correction by his hand alone, it must be evident that an early termination of the labor is indicated in the double interest of the mother and child; and that, consequently, the forceps should be preferred in such cases to the lever.

The attempt to seize the head properly with the forceps and bring it down into the excavation, does not always succeed, in which case the difficulty may be overcome by turning; at least, I found it to answer in two cases of failure by the forceps. I think, also, that I should be disposed to have recourse to it immediately, when the uterus was but slightly contracted, and still contained a considerable amount of water.

The occipito-posterior positions which are not converted naturally into anterior or pubic ones, may also allow of the spontaneous disengagement of the head, though, as we have already stated, they sometimes present insurmountable obstacles to the termination of the labor. We repeat that we have but little confidence in efforts made with the fingers to produce this movement of rotation, and that the application of the forceps seems to us the most useful means that can be employed. (See *Forceps.*)

It is important to observe that the continuance of the occiput posteriorly sometimes prevents the engagement of the head, which remains, long after the membranes are ruptured, above the superior strait, and that, notwithstanding the contractions are powerful. In such cases, the posterior fontanelle is hidden by the swelling of the scalp, and in order to diagnose the position, it is necessary to carry the finger upward and in front, when the anterior fontanelle will be discovered. At each contraction, the vertex

in the left anterior occipito-iliac position, and was at the same time inclined on the right parietal region. In descending into the pelvis, it retained this position, so that, when it had reached the floor of the excavation, we detected the ear; but it became rectified, after several strong pains, and cleared the inferior strait immediately after having undergone the movement of correction. The head was small, although the fœtus was at full term

strikes the horizontal branch of the pubis, and the presentation then tends to become converted into one of the *nucha*, so called by the old accoucheurs. I have noticed this anomaly more especially in the left occipito-posterior positions, and have always been obliged to use the forceps; quite powerful efforts are usually required to extract the head.

The vertex positions, even when not inclined, sometimes present anomalies in their mechanism. Thus the movement of rotation, which in the transverse positions is calculated to bring the occiput under the pubic arch, is occasionally delayed for a long time, and thereby greatly retards the labor. When this delay is dependent on the feebleness of the uterine contractions, an application of the forceps is the best remedy. But, according to many authors, it may also be owing to what Levret called the wedging-in of the shoulders; that is, the latter then present their long bis-acromial diameter to the smallest one of the superior strait, and thus become firmly engaged or wedged there, in such a way that they cannot descend any further, and therefore arrest the progress of the head. This wedging of the shoulders, which can scarcely occur without a slight contraction of the abdominal strait, has been detected by Levret, by Delamotte, by Ruysch, *et alis.*, and its occasional occurrence is admitted by Desormeaux and Dugès; consequently it should be regarded as being possible. (See p. 840.) This cause of dystocia would scarcely ever be suspected during the labor, unless attention were drawn to it by the mobility of the head in the excavation (Fried); this is the only sign that would be likely to arouse attention, where a normal conformation of the inferior strait has been ascertained, and where the contractions are strong and sustained. Under such circumstances, Levret advises (and Desormeaux seems to approve the counsel) the patient to be placed on her elbows and knees, with her head declining, with a view of removing the weight of the child's shoulders from the mother's parts; and then the accoucheur should slip his hand along between the head and the pelvic walls, seize the shoulder that is locked at the sacro-vertebral angle, draw it to one side and change its position. Although the performance of this manœuvre is attended with difficulty, yet it is the only one practicable if the fœtus be living; but where it is dead, he ought to diminish the head by craniotomy, so as to open a more ready passage up to the shoulders.

Supposing this diagnosis to be well made out, it would seem proper to follow the recommendation of Desormeaux; but the fact is, it is so very difficult that, as M. Jacquemier judiciously remarks, the use of the forceps, though in reality irrational, is perhaps the only remaining resource.

The rotation of the head, in virtue of which the occiput gets under the symphysis pubis, may likewise be rendered difficult, or even wholly impossible, by the size of the sero-sanguinolent tumor of the scalp, that is always formed when the head remains in the excavation for some time; for, by engaging itself in the void of the pubic arch, this tumor may render the movement of rotation absolutely impossible. (Tarnier. Of course, the forceps must then be applied.

Direct occipito-pubic or occipito-sacral positions are very rare, though certainly it is a mistake to deny their existence. We have already stated that the occiput may be in relation with any point of the superior strait

In the immense majority of cases these direct positions are converted, after the labor begins, into the diagonal ones; for the convexity of the forehead in the occipito-pubic positions, and that of the occiput in the occipito-sacral ones, having to glide over the sacro-vertebral angle, are almost always turned either to the left or to the right.

In some cases, however, the primitive positions continue, and the labor terminates in nearly the usual manner. It occasionally happens that if the head is large, and the pelvis but moderately developed, though well formed, the former is arrested at the superior strait, and impacted, as it were, by the two extremities of its occipito-frontal diameter. In such cases, the application of the forceps is the only resource.

§ 2. Inclined Positions of the Pelvis: Anomalies in the Mechanism of Labor.

Sometimes one hip, at others the lumbar region, or the lower part of the abdomen, according to the direction of the inclination, may engage first at the upper strait; particularly where the uterine obliquity is well marked. We must, therefore, correct this obliquity, which is the original cause of the anomaly; then, if that is not sufficient to replace the breech in a horizontal position, the feet are to be sought after and brought down, or else one of the groins be acted on by hooking a forefinger into it. (See *Mechanism of Labor in Breech Presentations.*)

§ 3. Inclined Positions of the Face: Anomalies in the Mechanism of Labor.

The face positions may likewise be irregular; that is, it may happen either that only one cheek engages, in consequence of a lateral inclination, or else that the head, being but little extended, the forehead is found at the centre of the superior strait; or, on the other hand, this extension being carried to an extreme, that the chin and the front of the neck are alone accessible to the finger; but in all these, as in the preceding cases, nature herself is generally able to accomplish the delivery. The instances in which the forehead is first placed at the centre of the upper strait are quite frequent; but the extension being completed at the moment when it engages the excavation, the face then becomes completely horizontal. (See *Mechanism of Labor by the Face.*) The same is true of the *malar* positions, the correction of which, like that of the *parietal* positions of the vertex, is effected during the period of descent. In those rare cases where the inclination resists the power of the uterine contractions, the correction with the hand at first, then, in case of failure, the application of the forceps, if the head is engaged and immovable, or the pelvic version, if it be high up and can easily be displaced, appear to us the proper measures.

The spontaneous reduction, just alluded to, as the most ordinary termination of the frontal or malar positions, is much more difficult in the cases where the chin, in consequence of the excessive extension of the head, has a tendency to engage first, and approach the centre of the excavation. For then, according to the observation of Madame Lachapelle, the head not only presents unfavorable diameters, but the body likewise shows a disposition to

descend along with the face; though at the same time it presses the latter back from the passage, and thus creates an obstacle to its escape, while the contraction transmitted by the spine rather tends to augment than to correct the inclination. Under such circumstances, we can trust less to the powers of nature, and therefore must endeavor to change the position by a resort to pelvic version. (See Schatz's method of external manipulation, p. 347.)

These lateral inclinations are usually primitive, and, as we have already stated, are reduced spontaneously into correct positions. But it may also happen that a position which is entirely regular at the beginning of labor may become converted into an inclined one, which nothing can restore. Thus, Dr. Birnhaum, of Bonn, mentions a case of right tranverse mento-iliac position, of the most regular kind, which became converted into a left anterior occipito-iliac one, strongly inclined upon the right parietal bone. The labor had to be terminated by the forceps.

It is well known that a spontaneous delivery in face positions requires that they should be converted into mento-pubic ones; but this process of rotation, which is easily effected in the mento-anterior varieties, that is to say, in the cases where the chin was primitively in relation with some part of the anterior half of the pelvis, is much more difficult in the mento-posterior positions, and sometimes even it does not take place at all. And it must be acknowledged that an unreduced engagement of the face, and its want of tendency to reduction, constitute one of the most serious difficulties met with in the obstetrical art.

Now, with a view of more clearly specifying the various indications for treatment that may present under such circumstances, we will suppose four different cases of face positions, namely:

1st. A woman has been in labor for a considerable time, the membranes are ruptured, and five or six hours, or even more, have elapsed since the waters escaped, during all which period the uterine contractions have been very strong; a good conformation of the pelvis, and a complete dilatation of, and no resistance from, the os uteri are recognized by the touch, and yet the presenting part still remains high up and does not engage in the excavation; but, in searching for the causes that retain this part at the superior strait, under so many favorable circumstances, it is found that the face presents in a mento-posterior position. Here there would be reason to conclude, in my estimation, that the delay in the labor is dependent on the non-reduction of the mento-posterior position into an anterior one; and, therefore, I think that an attempt should be made to convert the face position into one of the vertex. This could be done by introducing that hand whose palmar face embraces the vertex most readily; which would be the right one when the chin is directed backwards and to the right side, and the left in the opposite case; then, after having grasped the head with the whole hand, endeavor to push it up above the superior strait, and, if successful, surround the vertex with the palmar face of the four fingers, and flex the head on the chest, when, the position of the face being converted into one of the vertex, the uterine contractions will accomplish the rest.

I am now convinced that this manœuvre will rarely prove successful, therefore it should be attempted very carefully, and pelvic version substituted for it without much delay.

2d. If, to the mento-posterior position just described, whether the face be engaged or be still above the abdominal strait, any *accident whatever* be joined *that demands a prompt termination of the labor*, it is evident that the pelvic version is the only operation that could be resorted to with a prospect of advantage.

3d. If the mento-posterior position is coincident with a moderate contraction of the pelvis, most authors advise the conversion of the facial position into one of the vertex, and then the application of the forceps upon the flexed cephalic extremity. It seems to us, that this previous cephalic version would prove very difficult, if attempted long after the membranes are ruptured, and we should give preference to turning by the feet. We shall have occasion hereafter to settle this question when we come to discuss the use of the forceps in cases of contracted pelvis. (See *Forceps.*)

The application of the forceps on the face in the mento-posterior positions, seems to us an extreme measure, which should only be employed when nothing else can be done, as in the next variety.

4th. Lastly, there are some unfortunate cases where it is impossible to push up the presenting part, either because the head has cleared the cervix uteri, or because the strong contraction of the womb renders every attempt abortive; and, therefore, both the pelvic and the cephalic versions are altogether out of the question. The accoucheur must then necessarily have recourse to instruments. The lever, the common forceps, the crotchet, and the embryotomy forceps have all been proposed in turn; but before resorting to the latter, the first should always be tried.

In certain cases, the lever has proved very useful, and, where applied on the vertex or occiput, has occasionally depressed this part, and thus converted a face presentation into one of the vertex. It is oftentimes more easily managed than the forceps when the head is high up, owing to the difficulty of getting the second blade of the latter to the proper height and position; and I may mention that it proved very serviceable in a case to which I was called by Dr. Fournier, where the head had engaged in the excavation, in the right mento-posterior position, and could neither be pushed up nor advantageously grasped by the forceps.

I believe that, in common with many practitioners, I have erred in proscribing this instrument almost altogether from practice; for the lever, in my opinion, may render very important aid in those posterior positions that approach a transverse character; and in which, from being still high up, an application of the forceps is exceedingly difficult. (See *Lever.*)

As to the forceps, though proscribed by Madame Lachapelle, in the cases under consideration, it may be tried as a last resource, being far better than embryotomy when the child is living; but to be successful, it is necessary that the operator should be well versed in the movements that are to be given to the head by the instrument. Thus, supposing the blades are properly applied on the sides of the head (and the difficulty of this is well known), should we attempt to bring the chin round in front (Smellie)? or would it be better, leaving the chin posteriorly, to endeavor to depress the forehead and occiput, and then to disengage these parts first under the pubis? Relying on the cases published by former authors, I do

not hesitate to decide in favor of the last manœuvre; for every practitioner must acknowledge that the rotation of the chin forwards exposes the child to very great dangers from the extent of the movement in the atloido-axoid articulation, and the two favorable cases reported by M. P. Dubois, which he himself considers as exceptions, cannot make us overlook all those in which this excessive rotation has cost the child's life.[1]

I am willing now to be less exclusive, for M. Blot's facts, besides some others, have convinced me that artificial rotation of the chin in front may sometimes be accomplished without necessarily compromising the life of the child. We may be content, indeed, to bring the chin up to the ischio-pubic ramus, in which case, if it were a sacro-iliac position, the rotation would hardly exceed a quarter of a circle; and if it were at first a mento-sacral position, we might hope that the uterine contractions would cause the body to follow the rotation given to the head by the forceps, and twisting of the neck be thus avoided.

We shall see hereafter how far the modifications of the process to be employed, recommended by MM. Champion, Baumers, and Danyau, are capable of facilitating this rotary movement.

If it be found impossible to rotate the head, what should be done next? Grounding myself on the observations of Smellie (t. xi. p. 570), of Meza (*Acta Regiæ Societatis Med. Hauniensis*, t. xi. p. 379), and of Siebold (*Siebold's Journal*, ann. 1830, p. 209), I think that one might, after having applied the blades as accurately as possible on the sides of the head, draw directly downwards and backwards, with a view of depressing the vertex.

I am well aware of the objections to this mode of procedure, and that it may be said that, during the movement of flexion, which you impress on the head, the long occipito-mental diameter must necessarily pass one of the diameters of the excavation, thereby often creating an insurmountable obstacle to the delivery. I do not deny the force of this objection, and am willing to confess that in theory it is not altogether satisfactory; still, of

[1] I have had occasion to prove very evidently the danger attendant on this extreme rotary movement.

In July, 1845, I had charge of a case of right mento-sacro-iliac position in a primiparous female, and the continuance of which rendered delivery impossible, and required the intervention of art. After fruitlessly endeavoring to press up the head, we were obliged to use the forceps, the child being still alive. Having applied the blades upon the sides of the head, we endeavored to bring down the vertex, but it was impossible. Neither was one of the branches of the forceps applied as a lever upon the vertex more successful. We thought it right, before having recourse to embryotomy, to endeavor to turn the chin in front; therefore, replacing both blades of the forceps, we turned the head so as to make the chin correspond with the right extremity of the transverse diameter, and next, after a slight rearrangement of the blades, behind the right acetabulum. The face was then in the lower third of the excavation, and the vulva being partially opened by the instrument, we saw distinctly motions of the lips and tongue of the fœtus. The rotation was then completed, and when once the chin came in front, the head was disengaged by the usual flexion. Though the heart of the fœtus still beat feebly, it could not be restored to life by long-continued and well-directed efforts.

I am convinced that the death of the fœtus was in this case simply due to the extreme twisting of the neck.

what consequence is the theoretical impossibility, where positive facts bearing on this point can be adduced, and some of which I have just quoted? But the somewhat material authority of facts is not the only one I might invoke; for does not our reason tell us that, when any of those cases (fortunately very rare) are presented in practice, which seem beyond the pale of all theoretical notions, and in which the practitioner is constrained to do what he can, not what he would, the wisest course is to follow as closely as possible the route traced out by nature? Now, has it not often happened that the labor terminated alone, in the mento-posterior positions of the face, and yet the chin has remained behind throughout? And what has been the mechanism under such circumstances? By consulting the published cases, we shall find that the uterine contraction was incapable of depressing the chin, and has seemed to transfer its action to the occiput; and then the forehead, the vertex, and the occipital extremity, by slipping behind the symphysis pubis, have successively appeared at the centre of the pubic arch. It is not, therefore, logical to recommend an attempt to impress the same movement of flexion on the head, in the hope that the tractions by the instrument, coming to the aid of the expulsory efforts of the womb, would succeed in accomplishing what these latter alone could never effect.

What we have stated respecting the impossibility of spontaneous conversion in direct mento-sacral positions, and of its natural explanation in the diagonal mento-posterior positions, finds here its practical application. The consequence is, that if the chin were turned directly toward the anterior face of the sacrum, we should, before flexing the head with the forceps, impress upon it a slight rotary movement, which would bring the chin to one of the sacro-iliac symphyses, preferably toward the right, in order to avoid compressing the rectum, which is situated to the left.

My own experience, as well as that of others, has so much changed my view in regard to this point of practice, that I willingly admit having been hitherto too exclusive. I believe, therefore, that both methods may succeed in some cases, and it being impossible to determine *a priori* in which one or the other will be more successful, it were prudent to try them successively.

It should, therefore, be well understood that accoucheurs of the present day, drawing encouragement from the successful issue in certain cases of a recent date, are of opinion that the first effort should be to bring the chin under the symphysis pubis.

Again, there are some unfortunate cases in which, after having vainly attempted all the different manœuvres just referred to, craniotomy becomes our only resource.[1]

[1] I have quite recently witnessed a case of this nature with Dr. Letannelet, who requested my attendance on a young lady in her first labor. I saw her at eight o'clock in the evening, and detected, as my learned associate had previously done, a right mento-posterior position (the frontal variety): the head had been firmly engaged since three o'clock in the afternoon, and from that hour had not advanced a single line. At eleven, as no change had taken place either in its position or elevation, we attempted unsuccessfully to push it up. Both M. Letannelet and myself tried the lever and the forceps in vain; but before resorting to craniotomy, which was then deemed indispensable, we requested M. Dubois to see the patient. He arrived at one o'clock in the morning, and renewed the attempts that we had before made, without any better suc-

Do not the suppositious cases just given (which could easily be sustained from the facts reported by authors), by rendering us acquainted with the various difficulties that may be encountered in these cases, lead us to adopt, for the mento-posterior position, the rules heretofore laid down by Baudelocque, Gardien, and others, for all face positions? And though, in the present state of our science, the mento-anterior positions should be abandoned to nature, yet does the same rule hold good with regard to the mento-posterior ones? In a word, if this last position be clearly recognized before or shortly after the membranes are ruptured, should we not, prior to the engagement of the face, and while the head is still movable, endeavor to convert it into a vertex position, and thus prevent the difficulties that might subsequently arise? If I had to decide under such circumstances, I would certainly resolve the question in the affirmative.

§ 4. Presentation of the Trunk.

A natural delivery in trunk presentations is a very unusual occurrence, and one upon which the accoucheur should never rely. It is therefore an absolute rule in practice to attempt to bring one extremity of the fœtus to the superior strait as soon as possible, by resorting either to the pelvic or the cephalic version. (For the divisions, causes, and diagnosis of this mechanism, see *Natural Labor*, page 368, *et seq.*; and for the indications, the chapter devoted to *Version*.)

§ 5. Complicated Presentations.

Under the title of "fallings" (*procidentiæ*), Madame Lachapelle has described the untimely descent of any part whatever of the child, which cannot of itself constitute a particular position on account of its smallness or mobility, but which, however, might complicate the presentation of a more extended region. Thus, the umbilical cord, the feet, or the hands, may individually or collectively come down at the same time as the head or breech. This complication will be very readily detected by the touch, and therefore it is unnecessary to enumerate the peculiar signs that distinguish each of these parts.

We have already spoken of a falling of the cord, and of the means of remedying it. Again, in those cases where one hand has slipped under the head or breech, the labor may terminate alone if the pelvis is well formed and the contractions are strong and continued; and hence we should delay all operations. Even the presence of both hands on the lateral parts of the head has not always proved an insurmountable obstacle to the spontaneous termination of the labor, for all these parts have occasionally been expelled together; but if the passage be somewhat contracted and the soft parts resistant, it would be advisable to terminate the delivery artificially by the application of the forceps or by version, according to whether the head has or

cess, and craniotomy was then decided upon; but as the woman had great need of rest, and the necessary instruments were not at hand, the operation was deferred until eight o'clock A. M., when it was accomplished with much difficulty, but, owing to the skilful use of the embryotomy forceps, M. Dubois had the greatest trouble in extracting the head with the

has not cleared the superior strait; and to bring down the feet in the breech presentations. This latter plan should also be followed if one foot instead of the hand, or if both a foot and a hand accompany the head. Nevertheless, before resorting to an artificial delivery, the accoucheur should always endeavor to push back the hand or foot into the uterus and get it above the head. Most frequently, it will only be necessary to sustain it there during the pain, which urges on the head, to find the latter descending alone and arriving at the inferior strait, and then the labor may be abandoned to nature. We must remark, however, that a foot is far more difficult to return than the hand, and that in consequence of its volume it often constitutes an obstacle which cannot be surmounted by the ordinary resources; wherefore, craniotomy is sometimes indispensable, as several recorded observations fully prove.

A descent of the foot has hitherto only been observed, I believe, in the presentations of the *flexed* cephalic extremity; but I have had an opportunity of meeting with it in a *face* presentation; and the rarity of the circumstance, together with the difficulties that attend the delivery, induces me to narrate it here in detail:

I was suddenly aroused on the 4th of November, 1842, at five o'clock in the morning, by M. X——, a pork butcher in the Rue du Cadran, who came to request my attendance on his wife, who had been in labor for two days previously, under the care of Dr. Lorne, her physician and accoucheur. Having arrived at the bedside of the patient, I learned the state of the case from my worthy associate, after which I proceeded to an examination per vaginam. But before stating its result, I must here transcribe a short account of the case, sent me by M. Lorne himself, who gives the detail, much better than I could (from simple recollection), of what he learned of this woman's previous history, as also an account of what occurred during the labor. He says:

"I was summoned to the Rue du Cadran, No. 7, on the 2d of November, 1842, at six o'clock in the evening, to attend Madame X—— in her confinement. I ascertained from the patient that she had had seven children, and from her account the former labors had terminated in the following manner, namely:

"1. First child: a long and painful labor of three days' duration; presentation of the cephalic extremity; the labor was natural, but the infant died a few days after its birth.

"2. Second and third child: presentation of the pelvic extremity; delivery spontaneous, or by the aid of simple tractions; both children dead.

"3. Fourth child: the uterine contractions disappeared for twenty-four hours after the rupture of the bag of waters; expulsion of the child during the accoucheur's absence.

"4. Fifth and sixth child: presentation of the cephalic extremity; labor long and painful; delivery natural. One of these infants lived a few months.

"5. Seventh child: shoulder presentation and a descent of the arm. M. P. Dubois, having been called in consultation, ascertained the child's death, and performed embryotomy. After the parturition there was an inflammation of one or more of the abdominal organs.

"Madame X—— is thirty-two years of age, is of medium height and sanguineous temperament, and exhibits all the evidences of good health. Nothing in her external organization would lead us to suspect the existence of any deformity of the pelvis, and the normal pregnancy seemed to be at its regular term. The preceding night she experienced some pains, which passed off in the morning, but again reappeared at six o'clock in the evening. I examined her, soon after my arrival, and found the os uteri dilated to the size of a five-franc piece; I readily distinguished the bag of waters, which was relaxed in the intervals, but was tense, and protruded through the uterine orifice during the pain; but I could recognize no part whatever of the fœtus. At midnight the amniotic sac projected into the vagina like a *stuffed pudding*, and descended nearly to the vulva, when it soon ruptured spontaneously and permitted the escape of more than two pounds of the waters. But still I could touch no part of the child, even after the discharge of the waters, at any height within the reach of my finger. Now, however, the scene suddenly changed; for the pains, that were hitherto strong, died away; and as the patient assured me that the uterine contractions had been thus suspended for twenty-four hours in a former labor (the fourth), and afterwards regained a sufficient degree of force to effect the delivery, I had her replaced in bed.

"I found the woman in the same condition at eight o'clock in the morning of the next day, the 3d of November; some pains were perceptible in the left groin and flank, but the parts of the fœtus were still inaccessible. . . . . No notable change occurred in the course of the day. Nine P.M.—I recognized the left leg and foot lying across the os uteri at the superior strait; the pains were very strong, though they had not the characters of the expulsive ones.

"Nov. 4th, the pains were stronger, but the labor did not advance. As the os uteri was sufficiently dilated, I concluded to search after the second foot, but it proved to be rigid, and would scarcely permit the hand to enter. I found a hard and rounded tumor just above the foot first detected, which I suspected to be the head. But after making some vain attempts to push it up, and to find the right foot, I sent for M. Cazeaux."

Having received this history of the case, I proceeded to an examination of the state of the parts. I found a foot at the upper portion of the vagina, which proved to be the left one, with its heel directed backwards, and a little to the right; then, by passing my finger behind the symphysis pubis, I detected a voluminous tumor, which was pressed so forcibly against the anterior arch of the pelvis, that I could not insinuate the finger between it and the pubic symphysis; at first, I thought it was formed by the right buttock, and I diagnosticated a right posterior position of the breech, with the left limb doubled up on the anterior part of the belly, and the other, on the contrary, stretched out along the abdominal and thoracic plane of the child. The contractions again became strong and energetic, but, notwithstanding the complete dilatation of the cervix, the presenting part did not engage. While searching for the cause of this delay, I carefully examined the pelvis, and detected a considerable prominence of the sacro-vertebral angle, whereby the antero-posterior diameter was reduced to three inches

and one-eighth at the most. I then resolved to draw on the foot, but, to my great surprise, these tractive efforts proved wholly ineffectual. By again placing my hand on the tumor, that I had originally taken for the anterior buttock, I found it to be harder and much more voluminous than I had at first supposed, and I recognized it as the head, surmounted by a large and soft tumor, or *caput succedaneum*. I tried in vain to find the sutures and fontanelles; but, by gently slipping the fingers between this tumor and the leg belonging to the presenting foot, I felt a very irregular surface, and soon after recognized distinctly the eyes and eyelids, and then the other signs of a face presentation. It was, in fact, an irregular presentation of the face, in which the chin was directed backwards and to the left, and somewhat engaged at the superior strait (a left mento-iliac position, and the head not completely extended: or, in other words, Baudelocque's fourth position of the forehead). To sum up, I was in attendance on a woman whose sacro-pubic diameter was but three inches and one-eighth at the outside, and whose fœtus was presenting in an irregular or frontal variety of the left posterior mento-iliac position, and this complicated by a descent of the left foot; besides which, the waters had been entirely evacuated for thirty-two hours, and the uterus was strongly retracted. I was not discouraged, however, by all these difficulties; my first thought was to push up the foot that had become engaged under the head, but all such efforts proved abortive; I then applied (though not without some trouble) a fillet on the foot, and endeavored to press back the head, while drawing at the same time on the fillet; but this was equally unsuccessful, for the head was firmly sustained by the powerful contractions of the womb, and did not move. As the child was still alive, I next decided on the application of the forceps. The introduction of the blades and their articulation were effected both without difficulty and without much suffering to the patient, and they were placed on the sides of the pelvis; but, notwithstanding the most powerful tractions, which were kept up for half an hour, I could not make the head advance in the least degree. After resting for a few moments, I withdrew the instrument in order to reapply it, and this time I was fortunate enough to place the blades directly on the sides of the head; I then communicated to the handles a slight rotary movement, so as to get the face in a transverse position. But all proved ineffectual, for I drew with all my force, and M. Lorne succeeded me; both of us exhausted our strength to no purpose, and I then withdrew the forceps, and permitted the woman to rest for an hour. Having decided on a resort to craniotomy, if a third application should be equally unsuccessful, I requested my associate to go during this interval after Smellie's scissors, and the embryotomy forceps. An hour afterwards the common forceps were again introduced and easily applied, and tractions on

FIG 114.

The left posterior mento-iliac position complicated by a descent of the left foot.

the fœtus were once more made by M. Lorne and myself for half an hour without any better success.

Being then fully convinced of the impossibility of a natural delivery, and of the impotence of our efforts; as also that, notwithstanding the existence of the heart's pulsations, the unusual delay in the labor (thirty-two hours after the amniotic sac was ruptured), and the compressions made by the instrument, must have necessarily compromised or even destroyed the viability of the fœtus, and having only to choose between a bloody operation on the mother or a mutilation of the child, I resolved on the performance of embryotomy. Smellie's scissors, covered at their points by a little pellet of wax, were guided along the palmar surface of my left hand, and directed perpendicularly on the head, where they had to penetrate through the soft parts to the depth of nearly an inch before meeting with any resistance from the bony vault; I then rotated them, and they entered into the substance of the brain without difficulty; I next opened the blades in two different directions, so as to make a crucial incision, the radii of which were about half an inch in length; then penetrating still deeper into the cerebral substance, I worked the scissors in various directions so as to break up the brain. The male and then the female blade of the embryotomy forceps were next introduced, and locked without any trouble, as also without pain to the patient. The articular part touched the vulva. By aid of the vice, I next closed the instrument, leaving only a space of about one inch between the ends of the handles, and tractions were then made; but I soon found the blades slipping. It was necessary to begin the operation anew, and the same accident occurred again. The third time the slipping commenced, and I only succeeded in arresting it by suspending the tractions, and closing the forceps more firmly, when the head was finally extracted; but the chest was arrested at the superior strait, and considerable efforts were still necessary for the extraction of the rest of the trunk. The delivery of the afterbirth, being immediately effected, presented no particular difficulty.

In a case of twin labor, the particulars of which were communicated to me by Dr. Leflem, of Pontrieux, the second child presented in a mento-pubic position, complicated with procidentia of the right foot and right hand, the heel of the foot being turned toward the pubis. It is true, that since an attempt to turn had been made by a midwife, it is impossible to know whether these situations of the hand and foot were spontaneous, or the result of awkward manipulations. However this may be, M. Leflem found it impossible either to push up the head or to use the forceps with advantage. Not having the proper instruments for performing embryotomy at hand, he was obliged to leave the patient for a few hours, and on his return he found that she had expired.

It is possible that, if, after having discovered the impossibility of turning, occasioned by the contraction of the uterus, bleeding to syncope had been practised, or if the state of the patient did not allow of this, large doses of opiates or anæsthetics had been administered, the patient might have been delivered.

The unfolding of the lower limbs in the positions of the pelvic extremity and the stretching out of the arms in that of the shoulder, are hardly ever

comitants of the principal presentation, and should not be looked upon as an unfavorable complication. The extension of the arm, or the presentation of *the hand or arm* of certain authors, has been considered by them as one of the gravest complications of labor; but it has already been shown, in the article on Spontaneous Evolution, that a descent of the arm rather favored this latter process than otherwise; and we shall hereafter see that it is only from circumstances foreign to the presence of the arm itself, that the version is at times rendered more difficult. (See *Pelvic Version.*)

ARTICLE III.

DISEASES OF THE FŒTUS.

The diseases of the child, to be mentioned in this connection, are those which, by sensibly augmenting the size of one of its parts, create an obstacle to its passage through the pelvic canal. We have, therefore, to treat of hydrocephalus, hydrothorax, ascites, and the accidental tumors that may have been developed on various portions of its body, during the intra-uterine life.

§ 1. Hydrocephalus.

Under this term are included all the dropsies of the head, and all the effusions or infiltrations of serum within or exterior to the cranium.

Hydrocephalus has been described by authors as external or internal, according to the seat of the effusion; placing under the former variety all the serous or sero-sanguinolent infiltrations that are found beneath the scalp or pericranium. This latter affection has never hitherto been considerable enough to constitute an insurmountable obstacle to parturition. In fact, it is usually associated with a state of general œdema that destroys the fœtus at an earlier period of gestation; and, consequently, its expulsion is effected without difficulty, whatever may be the thickness of the scalp. I saw a seven months' child, at La Clinique, in 1838, in whom this part was a finger's breadth in thickness, and the mother also was quite œdematous; the labor terminated without difficulty. Desormeaux speaks of two very similar cases.

I do not know that the records of science furnish a single case of external hydrocephalus formed by a true collection of fluid, yet I have seen two cases of this kind of effusion. The subject will be referred to, presently, in greater detail.

Hydrocephalus internus, the only variety requiring a particular description, is such a rare disease, that Madame Lachapelle observed but fifteen cases of it in forty-three thousand five hundred and fifty-five labors.

In the estimation of pathologists, this is always a grave affection, on account of the danger to which it exposes the child after birth; but more particularly so, in the eyes of the accoucheur, from the difficulties thereby entailed on the labor itself. Moreover, these difficulties and dangers vary with the quantity of liquid effused into the cranium; because, where this is inconsiderable, the delivery is still possible, owing to the flexibility and the softness of the head, the walls of which are nearly all membranous; so that, by gradually moulding itself to the passage, the head becomes lengthened

out, and the labor is either terminated by the powers of nature alone, or else is effected without much difficulty by the application of the forceps, or by the pelvic version; but where the water exists in great abundance, the dimensions of the head exceed those of the diameters of the pelvis[1] so much that the delivery is absolutely impossible, unless the fluids be evacuated by an artificial puncture, or by a spontaneous rupture of the sutures, or fontanelles.

The following, according to Dugès, are the signs whereby a dropsy of the head may be recognized during the parturition: the finger falls upon a large and slightly convex surface, which covers every part of the superior strait without engaging, and has a variable consistence at different points; for, although hard and resistant while the pain lasts, it is, on the contrary, soft and fluctuating in some places during the interval between the contractions. Then, by passing the index regularly over it, the accoucheur can recognize pieces of bone separated by membranous interspaces, or soft commissures, as broad as the finger; and, at times, the fontanelles, equal in extent to the hollow of the hand. If the child has presented by some other part than the vertex, and the head is only accessible to the touch by its base, the separation of the bones detected by the finger will be much less, though it is often easily appreciable. Finally, if the dropsy be inconsiderable, the same characters will be observed, though they are less evident; and besides, the head being then more convex, and not so soft, will engage better in the pelvic excavation.

The diagnosis is sometimes rendered difficult by the elevation of the head; but when the latter is ascertained to be presenting, and the pelvis found to be well formed, the presence of the pulsations of the fœtal heart on a level with, or even above the umbilicus, may excite a suspicion of hydrocephalus. (Blot.)

According to Dugès, the signs furnished by the touch are not always to be met with, and I have seen two cases in which they were entirely wanting. These two cases, which, if my investigations are to be relied on, are unique, present instances of hydrocephalus with double effusion, viz., intra-cranian and extra-cranian.

A well-formed woman who had once been safely delivered was again in labor under the care of Dr. Bassereau. Thirty-six hours had elapsed when the Doctor called me in consultation. By this time the neck was completely dilated and the membranes ruptured, but the pains which were for a long time powerful had gradually lessened, so that the labor was almost suspended.

I discovered at the superior strait a large and soft tumor, offering none of the characters of the head, but [illegible] rather a presentation of the breech. During the contractions it became tense and elastic, but was [illegible]

[1] In a case reported by Wardrop, the [illegible] and [illegible] case. [illegible] from the [illegible] case of hydrocephalus, [illegible] inches.

of bony resistance. Upon introducing the entire hand within the vagina and grasping the tumor, I was able, by making unequal pressure upon various points of its surface, to perceive here and there a sense of fluctuation, and I knew that I had to deal with the head covered by a sac containing fluid. I then remembered having ten years before met with a similar state of things, and confidently diagnosed external hydrocephalus coincident, doubtless, with effusion within the cranium.

Nothing was revealed by auscultation. The child had ceased to live. An incision, one-eighth of an inch in length, was then made upon the top of the tumor, and about a glassful of liquid escaped. The soft and fluctuating tumor disappeared and the scalp alone remained between my fingers and the bones of the head.

The forceps were applied, but without effect, and three-quarters of an hour afterwards I decided to make another puncture; this time a quart of liquid escaped, and shortly after the head engaged, and delivery was spontaneously accomplished.

Ten years before, I was called by Dr. Saint Ange to a woman who had been in labor thirty-six hours, and in whose case various stimulants, amongst them, ergot, had been vainly employed. At the commencement of the labor my confrère had detected a vertex presentation, but feeling a large and soft tumor, I at first thought of a presentation of the breech. During an interval between the pains I pressed suddenly upon the tumor, and clearly distinguished the resisting surface of the bones of the head.

The forceps were twice applied in vain, when a puncture was made, giving issue to two glassfuls of liquid. The forceps were applied once more, and a dead child easily brought away.

The sutures were large, and within the cranium there was a collection of fluid which escaped upon an incision being made through a suture. There was, therefore, in this case, both internal and external hydrocephalus.

It were unnecessary to say how greatly this anomaly must modify the diagnostic signs pointed out by authors. Nothing but a sudden pressure upon the tumor, dispersing the extra-cranian fluid, will enable us to feel the bones of the head.

How, next, are the two collections of fluid to be explained? 1. It may be supposed that both are formed separately, one by pressing away the subcutaneous cellular tissue, and the other taking place in the intra-cranian cavities. This, however, is hardly probable; but, 2. It is possible that before labor the internal hydrocephalus alone was present, and that under the influence of the various kinds of pressure undergone by the head, necessarily unequal and partial as they must be from the very form and dimensions of the pelvis, it is possible, that under these circumstances a fissure might occur somewhere in a suture or fontanelle, allowing the liquid to pass from within outwardly and to form a tumor upon the external surface of the cranium.

The latter theory receives confirmation from the fact that, in the second case, M. Martin Saint Ange had no difficulty in detecting the head early in the labor, whilst at a later period I discovered it with difficulty, masked as it was by a soft and fluctuating tumor. But, supposing a communication between the two collections, how explain why the evacuation of the first was

not followed by the emptying of the latter? how account for the necessity of a double puncture in the first case and the persistence of the internal hydrocephalus in the second, even when the head was subjected to strong compression by the forceps? The fact merits further examination; but however the mode of its formation be explained, it is not less curious as respects both diagnosis and operative indications.

The indications for treatment presented by this affection vary with its extent, and according to whether the child is living or dead. Besides which, as Dugès justly remarks, the physician must not only base his determination on the size of the head, but also on its flexibility and its inclination to engage in the excavation.

When the cranium is of moderate size, is soft, reducible, and, from the influence of the strong, energetic contractions of the womb, gradually approaches the inferior strait, we should temporize, and be satisfied with favoring a spontaneous termination of the labor by the employment of the proper means. But if the delivery is delayed, and the pains are weakened or uselessly spent against insurmountable obstacles, the forceps should be at once applied. Nevertheless, the pressure and tractions on the head ought to be slow and gradual, with the view of preventing rupture, which can always be avoided by proceeding with gentleness, and remembering that the instrument is liable to slip.

Breech and trunk presentations are much more common when the fœtus is hydrocephalic, as shown by statistics furnished by Scanzoni; of 152 cases, 30 presenting some other part than the head, or 1 in 5. Now, under these circumstances, it is evident that the difficulties will not be felt until after the spontaneous exit or the artificial extraction of a great part or even the totality of the trunk, for then it is that the occipito-frontal circumference considerably enlarged engages in the superior strait.

The pelvic version would doubtless be resorted to in presentations of the trunk; but if the operator has been fortunate enough to detect the large size of the head before searching after the feet, he should, in my opinion, endeavor to bring the cephalic extremity to the superior strait.

When the size of the head is such that a spontaneous delivery is wholly impossible, and the application of the forceps or the pelvic version is not practicable, there is no other resource for saving the mother than to puncture the cranial vault, which alone can afford an outlet to the serum accumulated in its cavity. This operation may be performed with the trocar, the bistoury, or with any pointed knife whatever, after having taken the precaution to envelop its blade with tape, so as to leave only the point uncovered. This simple puncture of the membranous intervals is always preferable to the mutilation of the child. For, although the sudden collapse of the brain, which usually follows the evacuation of the liquid, nearly always occasions the death of the fœtus, still the latter may possibly survive such an operation; since a puncture of this kind made after birth has occasionally been followed by a complete cure. Smellie's and Stein's scissors should, therefore, be proscribed in these cases, and we ought to decide on plunging them into an intact brain only, when the opening made with a smaller instrument has not been free enough to permit the escape of the

liquid. It may happen, in cases of double hydrocephalus, that when the external fluid has been evacuated through a puncture, the labor may terminate either spontaneously or by the use of the forceps. Should it be otherwise, another puncture through the sutures or fontanelles will evidently be called for. In no case is a bloody operation on the female permissible, because the life of the infant is then too seriously compromised, by the mere fact of hydrocephalus, to think of sparing it at the expense of that of the mother.

Where the child is dead, cephalotomy would appear to us preferable, unless some serious difficulties in its performance were likely to be met with.

If cephalotomy be decided upon in cases of pelvic presentation, some difficulty may be experienced in perforating the cranium. Though it is often possible to pass the instrument through the arch of the palate, I would prefer repeating what I have already done in a case to which I had been called in consultation by M. Ducros, namely, to introduce the blunt hook into the orbit, and enter the cranium through the optic foramen. This process had been before recommended by M. Dujardin in a note addressed to the Academy of Medicine in 1851, but it is evidently practicable only when the child is dead.

[Hydrocephalus becomes a more serious matter when the breech presents, inasmuch as the true nature of the case is liable to escape detection. Again, supposing the diagnosis made out, perforation of the cranium is performed with difficulty, on account of its being accessible only by its base. In a case of this kind another course might be pursued, viz., to open the spinal canal by an incision between the spinous processes of the vertebræ, and through the passage thus made introduce a gum-elastic catheter provided with its wire. This is to be pushed into the cranium until it meets the water, which may then be discharged. The head will collapse immediately, and no further difficulty be found in its extraction. In my thesis for the Concours, I reported several cases in which this operation was successful. (Tarnier, *Thèse de Concours*, 1860.)]

§ 2. Hydrothorax and Ascites; Retention of Urine.

Ascites is even more rare than hydrocephalus, though it is met with somewhat oftener than hydrothorax. The signs indicative of dropsy of the chest are, a considerable enlargement of the thorax, a widening of the intercostal spaces, and an evident fluctuation in these enlarged intervals. On the contrary, the extraordinary size of the belly, the distention of its walls, and the fluctuation detected there, characterize ascites. The fœtus, being retained by the amplitude of one or the other of these cavities, is arrested in its progress through the pelvis, and the accoucheur finds the excavation filled up by a large, soft, and fluctuating tumor. In some cases of extreme distention of the abdomen, the walls of this cavity have been found to yield, so that a great part of the tumor remained above the superior strait, whilst the rest of the trunk gradually descended into the excavation; and when one portion of the abdomen had reached the exterior, the liquid gravitated towards this point, where the resistance was less, the portion remaining internally progressively diminished in volume, and the labor terminated naturally. Frank speaks of a dropsical child that presented by the breech, in whom a quantity of the serum had escaped from the abdomen into the scrotum; and

an evacuation of all the liquid was secured by making an incision into this part, which course should be repeated, if a similar case were to occur. But when the aqueous tumor of the chest or abdomen is large enough to be arrested by one of the straits, we should have recourse to puncture with the trocar.

A peculiarity which might readily be mistaken for ascites, consists in the accumulation of a large amount of urine in the bladder of the fœtus.

When treating of the secretions of the fœtus, it was stated (see p. 237) that a certain amount of urine was doubtless secreted during its intra-uterine existence, and we mentioned in support of the opinion, some instances in which obliteration of the urethra had given rise to enormous distention, and even rupture of the bladder. In a case communicated to the Academy of Medicine by M. Depaul, the bladder was so distended as to prove an insurmountable obstacle to the extraction of the fœtus.

[This case, conjoined with two similar ones, supplied M. Depaul with the material for an excellent paper, published in the *Gazette Hebdomadaire* of 1860. The Professor thinks that retention of urine has often been mistaken for ascites, which, according to him, is very rare. For further particulars the reader is referred to the paper above mentioned.]

Whether aware of the true cause of the difficulty, or hesitating between ascites or extreme distention of the bladder, it is evident that if properly directed tractions are ineffectual, an evacuation of the fluid is the only resource in either case. We would merely add, in accordance with M. Depaul, that since the permeability of the urethra may sometimes be re-established after birth, it is strictly indicated to perform the puncture as carefully as it would be done in the adult. The insertion of the cord would be a sure guide in choosing the most favorable point.

In a case observed by M. Moreau, ascites and considerable distention of the bladder existed simultaneously. The first puncture, though it discharged a large amount of peritoneal fluid, did not enable the extraction to be made, and a second one was necessary to evacuate the urine contained in the bladder. The delivery of the child was effected without difficulty immediately afterward.

§ 3. Emphysematous Condition of the Fœtus.

Merriman has remarked that, when the fœtus had been dead for some time, a large quantity of gas may be created in consequence of the putrefaction it has undergone; thereby greatly augmenting the volume and the distention of the belly, and consequently retarding the expulsion. "I have known," says he, "two instances of rupture of the vagina, arising from the rashness of midwives, who forcibly dragged the children, enormously swelled with putrid air, into the world. In one case, the vagina was torn completely through. Both the women died in a few hours. Had the bellies of the children been punctured, to give vent to the air, these fatal occurrences would have been avoided." (*Synopsis.*)

M. Depaul has recently published a case, in which not only was a large quantity of gas developed in the abdominal and thoracic cavities, but the limbs of the child were so greatly infiltrated as to present nearly a ball-

their natural size. After extracting the head by the forceps, it was deemed necessary to apply the cephalotribe forceps, and close them with such force as to reduce the size of the trunk considerably, and at the same time obtain a firm hold for traction. Whilst proceeding thus, a large amount of exceedingly fetid gas escaped with a report, and very strong tractions were required to disengage the chest and deliver the child. The uterus in contracting expelled a similar kind of gas.

Supposing the diagnosis to be well established, we agree with Merriman in the opinion that a previous puncture of the abdomen and chest would certainly have facilitated the use of the cephalotribe, or perhaps have even rendered its employment unnecessary.

§ 4. Tumors of Various Kinds.

The tumors, of divers sorts, with which the fœtus may be affected at the time of birth, and the size of which is occasionally so great as to impede its spontaneous expulsion, are not susceptible of being included under any general head, and the measures to be employed vary for each. Where they are pediculated, it not unfrequently happens that the pedicle is broken, either by the influence of the expulsory efforts of the womb, or the tractions made by the accoucheur. When their induration is not very great, they temporarily disappear, at times, from being compressed between the fœtal surface and the uterine parietes, or the osseous walls of the pelvis. The proper course is to remove them, when accessible, or to discharge their contents by means of a puncture where they contain a liquid. But, unfortunately, we can seldom even suspect their existence until the labor is already so far advanced that it is hardly possible to act. If their volume be excessive, the child's death will nearly always result from the delay and difficulty in the parturition, and then the conduct to be followed is clearly evident.

Certain tumors are also sometimes present in the great cavities, especially that of the abdomen, which may render spontaneous delivery difficult, and occasionally even impossible. A very curious case is mentioned by MM. Guilleton and Ollier, in which the obstacle to delivery was occasioned by an abnormal enlargement of both kidneys, due to an hydatiform hypertrophy of the glandular element of the Malpighian bodies. Tractions so strong as to tear away the lower extremities of the child failed to deliver it; but fortunately the pains returned, and the labor terminated spontaneously in a few hours.

In another case, quoted by Siebold, the child had presented by the pelvis, though the head was the first to appear, and was expelled without much trouble. The delivery of the body, however, required strong and long-continued tractions. The size of the abdomen was enormous; it measured seventeen inches in circumference, and eight inches from the xyphoid cartilage to the pubis. At the autopsy, the kidneys appeared as two large tumors, weighing two pounds; each one was six inches long, four inches wide, and three inches thick. (See, in the *Journal Hebdomadaire*, 1855, the bibliographical reference to several similar cases; see also Tarnier, *Thèse de Concours.*)

Still another case of dystocia, due to the enormous bulk of a cancerous

liver, is reported by M. Noeggeralt. Though the forceps were applied, the extraction of the head required the entire strength of the operator; and even then the pains, though very powerful, failed to deliver the shoulders; so that, having dragged fruitlessly upon the head, it was necessary to hook the fingers in the axillæ, and draw upon them forcibly.

The principal bulk of the fœtus was due to the abdomen, which had four times its normal size. An immense tumor, the liver, filled its cavity; it weighed two and a quarter pounds, measured eight and three-quarter inches in width, six inches from below upward, and three inches in thickness. The tissue proper of the liver was met with here and there, but the greater part of it was replaced by a heteromorphous mass resembling the gray substance of the brain.

[Various other tumors have been met with on the head, neck, and lumbar and sacral regions.

Tumors of variable size are sometimes developed upon the head, the most common being encephaloceles and meningoceles. The latter variety occur more frequently than the former, and sometimes acquire a volume equal to or greater than that of the head itself. In a case of the kind which I saw at the hospital of the Clinique, the child presented by the shoulder. Whilst turning, I felt a round and resisting tumor by the side of the head which I took for the head of another child. The operation was continued and the feet brought down. At first, the extraction was easy, but when the body had been delivered I encountered an unusual difficulty in the extraction of the head. It came down, however, suddenly, whilst drawing upon it, and with it a large tumor attached to the occipital region. A plaster cast which I had made of it is now deposited in M. Depaul's anatomical collection in the hospital of the Clinique. Dissection proved the tumor to be a meningocele.

Large tumors may also be attached to the neck, as in a case of dystocia published in the *Archives* by M. Monod where the tumor, as large as the head of a child at term, was attached to the neck by a pedicle which allowed it to turn to either side. The vertex presented, and after twenty-four hours of labor it became necessary to apply the forceps. The child, though born alive, lived but five hours. In this case, the tumor appeared to be cancerous. At other times, the neck is affected with a tumor formed by an hypertrophied thyroid gland. In a case of the kind which I saw quite recently, the tumor was of the size of the fist.

FIG. 115

The scrotal, sacral, and lumbar regions are quite frequently occupied by large tumors, such as hydroceles, spina bifida with hydrorachis, cancer and fœtal inclusion, all which may cause greater or less difficulty in the extraction of the child. M. Depaul relates, in a note, that he saw two children at the Clinique in whose birth there had been very

difficulty, and which had between the thighs an oval-shaped tumor almost as large as their respective heads. It was entirely distinct from the genital parts, arising from and seeming to lose itself in the deep-seated cellular tissue of the perineum. Careful dissection proved it to be composed of encephaloid matter.

Spina bifida with hydrorachis may affect the entire length of the spinal column, though it is only when it affects the lumbar region that it is liable to form a tumor large enough to interfere with delivery. I reported two cases in my thesis for the *Concours*, one of which was furnished me by M. Guibout. For a drawing of it, see Fig. 115.

A tumor in the scrotal or sacral region, large enough to require active intervention, may be due to fœtal inclusion. Several cases of the kind may be found in a paper published by Dr. Constantine Paul; and my colleague M. Joulin also devoted a long chapter to it in his thesis for the *Concours*, (Paris, 1863).]

In cases like these, the difficulty cannot be foreseen, nor even suspected, until it begins to exert its influence upon the labor. Tractions upon the head, arms, or axillæ, when the head presents, and upon the lower extremities under other circumstances, should be made at first moderately, and afterwards strongly; but, should they fail and the child be dead, it were better to perform embryotomy than to continue them so long as to risk laceration of the maternal organs. Evidently, if the tumor contain a fluid, the first thing to be done would be to evacuate it by one or more punctures.

§ 5. Anchylosis of the Fœtal Articulations. Gibbosity.

Dr. Busch has recently had an opportunity of observing a very singular case of dystocia, dependent on anchylosis of the articulations of the child's limbs, in which the forceps were applied, but after the extraction of the head, the trunk could not be delivered. Being unable to discover the cause of the difficulty, repeated tractions were made, at first moderate, but afterwards more powerful, when a cracking noise was heard, and the upper part of the trunk cleared the external orifice; but the lower portion of it likewise became arrested, and, as the child was dead, it was dragged out without hesitation, and the same cracking sound was again heard. At the autopsical examination, it appeared that the articulations of the limbs had been anchylosed in the ordinary flexed position exhibited by the fœtus in the womb, and that the bones of the arms and thighs were fractured. (*British and Foreign Med. Review*, p. 579, April, 1838.)

Our colleague Dr. Joulin mentions several other similar cases. Still more rarely is delivery made difficult by deformity (gibbosity) of the vertebral column.

ARTICLE IV.

FŒTAL MONSTROSITIES.

As the cyclops, the anopses, the acephalous and anencephalous fœtuses are delivered as easily as those having a normal conformation, we have no occasion to treat of them here.

[We would merely remark that in these cases, the diagnosis of the presentation is rendered difficult by the deformity of the parts with which the finger endeavors to come in contact. Anencephalous cases, however, afford certain peculiar indications which it is of interest to know. Whenever the finger touches the presenting

part, the fœtus is affected with convulsive and irregular movements which soon attract attention; the motions being probably due to direct irritation of the stump which is generally surmounted by the hairy scalp in cases of this kind. By this sign I was enabled to diagnose an anencephalous fœtus before the membranes were ruptured, to the great astonishment of the students at the hospital of the clinic where the labor occurred.]

ARTICLE V.

DYSTOCIA OCCASIONED BY MULTIPLE FŒTUSES.

§ 1. Of Multiple and Independent Fœtuses.

We pointed out the signs, in the article on gestation (see page 270) by which the presence of two or more children in the uterine cavity might be recognized during pregnancy, and described normal twin labor in another chapter (see page 375). It is now our duty to indicate the difficulties peculiar to this form of labor.

Usually, as was stated, the birth of the second soon follows that of the first, but if delayed, friction over the body and upon the neck of the womb are sufficient to stimulate contractions which soon complete the delivery. Generally, therefore, the action of the womb must be waited for patiently. (See page 377.) But is the labor to be abandoned wholly to nature, or should we attempt to deliver at once? In some instances, there can be no hesitation as to the proper course; thus, when the birth of the first child has been tedious and difficult, and has required the intervention of art, and the forces of the patient seem to be exhausted by the former effort; when any accident whatever that threatens the life of the mother or of the second twin, has occurred during or after the delivery of the first; and whenever the second one presents in such an unfavorable position[1] at the superior strait as to demand the pelvic version, this ought to be performed immediately. But in all these cases the expulsion should by no means be rapid, and the accoucheur will draw very slowly on the pelvic extremity, so as not to empty the uterus too soon, and thus avoid the inertia and attendant hemorrhage which might result in consequence of a rapid depletion. It would even be prudent, when the defective position shall have been converted, by the evolution, into a presentation of the pelvis, to trust the rest of the delivery to the expulsory efforts of the womb. The application of the forceps will rarely be necessary, because, if the head is so far engaged as to render pelvic version impossible, the labor will probably terminate without assistance. Nevertheless, should the incapacity of the uterus be complicated with any accident serious enough to compromise the life of the mother or child, it would be proper to have recourse to this instrument if the head had arrived at the inferior strait; but in all other cases the pelvic version ought to be preferred, because the introduction of the hand and the evolution of the fœtus will not fail, by the irritation they produce, to determine the retraction of the uterine walls, and thus prevent subsequent inertia.

When one of the twins, though dead, has remained in the uterus for sev-

[1] It is not very unusual to find the second child presenting by the shoulder — which is probably owing to the vacuum in the womb after the expulsion of the first child — a void that singularly facilitates the displacement of the second.

eral months, whilst the development of the other was constantly progressing, the little abortion is ordinarily expelled simultaneously with, or shortly after, the first child; but unless the accoucheur is very careful, and the size of the womb after the delivery should not excite his attention, its sojourn there may be considerably prolonged. No doubt, in these cases, the hand ought to be carried up into the womb, for the purpose of delivering the aborted fœtus, but this will not always prove an easy matter. In a case of the kind, communicated to me by Dr. Casaubon, the internal uterine orifice became strongly contracted immediately after the extraction of the placenta, and it was not without great difficulty that he eventually succeeded in overcoming its resistance, and reaching the uterine cavity. The little product was then removed, and proved to be an abortion of four months. The other infant had arrived at the end of the eighth month.

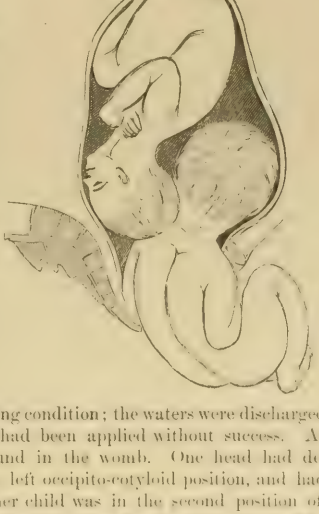
In certain cases, the presence of two children may render the delivery difficult, and require some special precautions; thus, it may happen: 1. That both present simultaneously at the strait, and retard each other's expulsion; here the most movable head should be carefully pushed up, so as to permit the other to engage first. The difficulty will be greatly enhanced if the two heads be engaged in the excavation at the same time, and neither of them can be pressed back; under such circumstances, the application of the forceps upon the one that appears the most engaged, and, if this does not succeed, the perforation of one of them, seem to me the only practicable operations. However, even here, very prompt action is unnecessary, for it might happen, if both heads were small, that a natural expulsion could be effected, an example of which is reported by Allen, in vol. xii. of the *Medico-Chirurgical Transactions*. The same plan is to be pursued when, instead of the heads, the breech or the feet of the two infants present together.

2. The first child may present by the shoulder; here, the pelvic version is evidently indicated, but in performing it the operator must be very careful to seize the feet of the right child before commencing the evolution, for if both the bags of waters were ruptured, nothing would be more easy than to get hold of two feet belonging to different children. It were much better to turn by drawing on one foot only. (See *Version.*)

3. Where the first presents by the feet, whether spontaneously or as a consequence of the pelvic version, the greater part of the trunk is extracted without difficulty, but the head may be arrested in the excavation or above the superior strait. Thus, in the twentieth observation of the fourth Memoir of Madame Lachapelle, the head of the first-born had drawn under it that of its brother, which had a tendency to present by the vertex, so that the latter one blocked up the passage of the former, while the first prevented the second from getting above the superior strait; but, fortunately, the children were small, and the head of the second twin escaped spontaneously, alongside of the neck of the first, and then the head of the first followed the neck of the second. A very similar case, given by Dr. Erwin, is related by Dr. Dewees. (Just such a case is represented in Fig. 116.) Had these two fœtuses been of the ordinary size, it is clearly evident that their expulsion could not have been effected until one or possibly both heads had been reduced by craniotomy. The mutilation of one child seems to me the only

recourse we have in these difficult cases; thus, it has properly been recommended to amputate the neck of the first twin, which would render the spontaneous expulsion of the second one possible, or at least would permit its extraction by the forceps; after which, the head of the mutilated infant should be sought after and brought down. However, before resorting to this cruel operation, an application of the forceps ought to be attempted on the head that descended first, as appears to have been done successfully by a surgeon of Dijon. In fact, from the smallness of the children, it is possible that, in many cases, the second head will afford but a feeble obstacle to the passage of the trunk of the child we are endeavoring to extract by the instrument.

Fig. 116.



4. M. Jacquemier relates a curious case witnessed by him at the Maternity Hospital. A woman, who had been in her labor nine days, was brought to the hospital in a dying condition; the waters were discharged three days before, and the forceps had been applied without success. At the autopsy, two children were found in the womb. One head had descended into the excavation in the left occipito-cotyloid position, and had passed the uterine orifice. The other child was in the second position of the left shoulder; its head rested in the right iliac fossa, and the front of its neck, which was situated below the anterior shoulder of the first fœtus, embraced the neck of the latter, in a semicircle, so as to prevent a further descent of the trunk; thus explaining the fruitlessness of the tractions made by the forceps. Both children were large.

5. Again, two feet occasionally present at the orifice; when, if the accoucheur deem it advisable to aid the expulsory efforts of the womb by tractions, he might, by supposing they belonged to one child, draw on both, and thus engage parts of both twins at the same time, which could not pass out together; therefore, if there is the least doubt of the character of the pregnancy, he should ascertain, before making any tractive efforts whatever, that the two limbs really belong to the same individual, which is done by passing the hand up into the womb as far as the hips; though it must be confessed that this diagnosis is frequently attended with great difficulty. Here, again, it is better to draw upon one foot only.

Pleissman states that, on one occasion, he found the orifice plugged up by the parts that had become engaged, and which at first sight appeared to him to be *a quantity* of hands and feet. A more careful examination enabled him to distinguish four inferior extremities, which were reversed as for ar-

the ham, and one arm. "At first," he says, "I was in great perplexity, because I could find no way of introducing my hand into the womb, for the purpose of distinguishing and seizing the two feet belonging to each child, and because all my efforts to make even one of these extremities go back again proved abortive; besides which, in drawing on any two of them, I might confound and bring down the feet of two different fœtuses at the same time; and, lastly, even if I succeeded in seizing the two feet belonging to the same child, I might, by drawing on them, engage the other parts, and thus augment the difficulties. Being greatly embarrassed as to the proper course, and yet obliged to act, the employment of a measure recommended by Hippocrates, under different circumstances, happily suggested itself; it was, to suspend the patient by her feet, hoping that the heads and the bodies of the children would, by their weight, draw one or more of the extremities towards the fundus of the womb, which was still distended by the waters. The husband and brother-in-law of the woman passed their arms under her hams, and thus held her suspended, so that only the head and shoulders rested on the bolster. I intended, as soon as I mounted on the bed, to press back one or more of the free extremities into the womb, but two had already returned from the mere position of the mother, and the other three soon followed by the aid of my fingers. Immediately afterwards, I was enabled to introduce my hand into the uterus, and to withdraw successively therefrom three children by the feet."

In bringing forward this case, I only desire to illustrate what has been said concerning the difficulty of diagnosis. I ought also to call attention to the impossibility of the reduction, and the singular procedure resorted to with a success that seems to warrant its employment again under similar circumstances.

§ 2. Of Multiple and Adherent Fœtuses.

The signs by which we are able to detect the presence of twins can in no wise aid in ascertaining the adherence, or the more or less intimate fusion, of two living beings into each other. The diagnosis is likewise very difficult at the period of labor; for, even after the twin pregnancy has been recognized, it is only by negative evidence that we can suspect the adhesion of the two children.

If two bags of waters are detected by the finger, if it is necessary to rupture the membranes twice, if the waters are discharged at two separate and distinct periods, the presence of independent twins in the womb may be regarded as certain; for there are never two envelopes for a double monster, and two perfect twins are very seldom inclosed in the same amniotic pouch. Again, if two feet or even a single one descend with the head, more particularly if the feet yield to the tractions made on them, and appear at the vulva without the head having a tendency to reascend, we may affirm there are two infants; because a monster is never composed of two individuals so united that the head of the one is alongside of the feet of the other; but if several limbs present simultaneously, we can only ascertain whether the children to which they respectively belong are joined together or are independent, by carrying the hand up into the womb. (Dugès, *Mém. de l'Académie.*)

Is it proper to interfere in all cases, whether the monstrosity be recognized or not, or should the delivery be abandoned to nature for a certain length of time? The recorded instances, which prove that a spontaneous delivery may take place, are too numerous at the present day to warrant an active intervention until after a sufficient length of time has been accorded to the uterine contractions to effect the expulsion. The mechanism by which the delivery is finally accomplished will also vary according to the particular kind of monstrosity.

When the two fœtuses are united by the breech or head, their expulsion takes place without any marked difficulty, and they generally escape one after the other, more particularly when they happen to be joined at the breech. But if connected at the occiput, the point of union is seldom flexible enough to permit the two heads to descend simultaneously; and if the patient is at her full term, the intervention of art will become necessary.

Where there are two heads for a single trunk, the mechanism varies according to whether the monstrosity presents by the vertex or by the breech; but the delivery is still possible, if the twins are slightly adherent and so movable as not to be invariably parallel, for then the two heads may engage successively and not simultaneously. In the vertex presentations, the anterior head, which is the most inferior on account of the obliquity of the body of the child situated in the line of the axis of the superior strait, engages first; and then the other, which had been primitively arrested by the sacro-vertebral angle, follows it. On the contrary, where the infant is delivered by the breech, the posterior head will engage the first, in consequence of the inclination impressed on the trunk by the axis of the pelvic canal; and the anterior one, which was hitherto delayed by the symphysis pubis, will engage immediately afterward.

When each head has its own body, but the two trunks are united by their lateral, anterior, or posterior faces, whether throughout their whole extent, or only in a partial degree, a spontaneous delivery is more difficult than in the former cases; but when it does occur, it takes place just in the same way. If there is only one head for two bodies, the latter are expelled simultaneously, and the only difficulties which can then present, depend on the unusual size of the head, which is sometimes very large.

The process does not always advance as favorably as we have just stated, since it is not at all unusual for one of the heads, where the double condition involves the whole body, or is limited to the head, to be arrested above either the sacro-vertebral angle or the symphysis pubis, and thus delay the subsequent descent of the one that is already engaged, or on the point of engaging.

What has just been stated concerning the mechanism by which the expulsion of the bicephalous fœtuses is effected, would naturally lead us to suppose, that, whenever one of the heads shall have been arrested above the superior strait, the pelvic version should be resorted to, if the monstrosity presents by its cephalic extremity or trunk; and if the breech descends first, to draw on the lower extremities. But, in either case, when the greater portion of the body is delivered, it would be necessary to carry it up in front of the symphysis pubis, so as to favor the engagement of the posterior head,

prior to the anterior one. Again, if the head that presents first shall have been engaged too long in the pelvic excavation to admit of being pressed back, and of the feet being brought down, it would be proper to make an application of the forceps, if the fœtus were still living; but, under such circumstances, this latter measure will often prove ineffectual, for the tractions made by the instrument will not overcome the resistance offered by the second head. We have, therefore, in this case only to choose between a bloody operation on the mother, and a division of the child's neck, which would permit the head that offered first to be removed, and thus render the pelvic version practicable. And here, notwithstanding the high authorities to the contrary, I do not hesitate to advocate the mutilation of the fœtus; for, in cases of this nature, I would have no scruple in sacrificing the infant's life to the safety of the mother.

CHAPTER XVI.

ARTIFICIAL DELIVERY OF THE PLACENTA.

Natural delivery of the placenta was described on page 381. We have now to study the difficulties and accidents which may attend the process, and for this purpose shall devote to them two different articles.

ARTICLE I.

DIFFICULT DELIVERY OF THE PLACENTA.

The difficulties that may require an artificial delivery of the after-birth are caused either by inertia of the womb, excessive volume of the placenta, weakness of the umbilical cord, irregular contraction of the uterus, or by intimate adhesions of the placenta itself.

Whenever repeated attempts to effect its delivery, made according to the rules stated (p. 381), prove ineffectual, the attendant ought to search for the cause of the delay, both by abdominal palpations and by a vaginal exploration. One of two things will then occur: either the placenta will be found lying over the internal orifice, or it will be so high up that the finger cannot reach it. Supposing the previous tractions had been made in the proper direction, an obstacle to the delivery in the former case could only depend on the unusual size of the after-birth, on the fragility of the umbilical cord, or on a contraction of the uterine orifice; in the latter, the placenta must evidently be retained at the fundus, either by abnormal adhesions, or by the irregular contraction of some part of the uterine walls. This first diagnosis being once established, the operator only has to decide upon which of those circumstances the delay is dependent.

§ 1. Inertia of the Womb.

We have hitherto stated that the contracted uterus forms a large, hard, and resistant tumor in the sub-umbilical region after the child is born. Now, it may happen, either from the general debility of the patient, or from

the feebleness or atony of the womb itself, that its organic contractility is not aroused and the organ still remains after the birth of the child in a state of partial or complete inertia.

This inertia of the womb (which will claim our special attention when treating of the hemorrhage that so frequently accompanies it after the delivery) may be simple or complicated with flooding; but we have only to speak of the first variety at the present time.

This condition is indicated by the large, soft, and insensible tumor, which is detected by applying the hand upon the abdomen.

If the inertia of the womb is not attended with flooding, it is probable that the placenta still remains undetached; and therefore no imprudent tractions should be made on the cord, lest a separation occur before the inertia is remedied. This would inevitably produce a frightful hemorrhage, which might cost the patient her life in a few minutes; or, should the placental adhesions resist the tractive efforts, the womb would be drawn down along with the after-birth, thus producing a partial or complete inversion of the organ. It is, therefore, a truly fortunate circumstance when the inertia is manifested before the separation of the after-birth is commenced. A further source of hemorrhage is found in the umbilical vessels; but this accident is exceedingly rare, and besides it can easily be remedied by applying a ligature on the cord.

The best course to be pursued in cases of simple inertia, is to wait until the uterus regains its powers; the return of the contractions might be accelerated, however, by moderate frictions over the lower part of the belly, or by titillating the os uteri with one or two fingers in the vagina, and by the application of cold compresses over the hypogastric region, and on the upper part of the thighs. In cases of partial inertia, some English practitioners, Dr. Murphy in particular (*London Med. Gaz.*), have recommended a tight bandage around the abdomen; or, preferably, a resort to immediate pressure over the uterus, by applying both hands on the sides of the organ. M. Guillemot asserts that he has often succeeded in arousing and keeping up the contractions by plunging the end of the cord in a glass of cold water; but we can scarcely comprehend how this singular result can occur. The patient's strength is to be kept up at the same time by some broth, or, possibly, by a little good wine, or brandy and water.

§ 2. Excessive Volume of the Placenta.

This may be either real, or due to the collection of large coagula in the pouch of the membranes, created by the inversion of the placenta in falling upon the os uteri, after its detachment. This source of difficulty is easily recognized by observing the unusual volume of the uterus above the pubis, and by detecting the detached mass at the os uteri by the finger.

In most instances, the natural contractions of the womb, assisted by a moderate traction upon the cord, are all sufficient for the delivery of the after-birth; though it is occasionally necessary to pass the hand into the vagina and to carry one or two fingers up into the uterine cavity for the purpose of hooking it down. When the increased size is owing to the accumulation of coagula in the pouch, the membranes, if within reach of the

finger, or the placenta itself, should be perforated so as to afford an outlet to the fluid part of the blood, whereby the total mass is diminished, and its subsequent expulsion or extraction facilitated.

The simplest method is to seize the placenta with the entire hand, and, after squeezing it, in order to expel the clots, withdraw it at once.

§ 3. Weakness of the Cord.

This weakness, whether owing to deficient development of the cord itself, as happens in cases of premature labor, or to the particular mode of distribution of the umbilical vessels, so well described by Benckiser in his inaugural thesis (see *Umbilical Cord*), may facilitate its rupture; and hence the operator ought to be very careful in pulling on this part. Again, a rupture of the cord during the delivery may be dependent on its oblique attachment to the placenta. Therefore, as a general rule, whenever the hand feels it giving way during the traction (for it produces a peculiar yielding sensation), the attempt should be discontinued; and, unless there are some special reasons to the contrary, the further delivery must be left to the powers of nature, or else the placenta itself should be laid hold of, if it be deemed proper to extract it immediately.

In conclusion, if, notwithstanding all proper precautions, the cord does become ruptured, the accoucheur has only to introduce the hand into the vagina, and pass up two or three fingers into the uterine cavity, so as to seize and extract the placenta.

It is then sometimes difficult to distinguish the placenta from the wall of the uterus itself, thus exposing the operator to make dangerous tractions upon the latter. The following signs may enable us to avoid committing an error of this kind: 1. The fingers applied to the fœtal surface of the placenta can distinguish the projections formed by the vessels which are distributed upon it. 2. Pressure upon the placenta would hardly be perceived by the patient, whilst it would be painful if applied to the wall of the uterus. 3. Lastly, the other hand applied upon the hypogastric region, is sensible of a greater thickness of parts intervening between it and the hand within the organ than could be due simply to the united thickness of the walls of the abdomen and of the uterus.

§ 4. Irregular or Spasmodic Contraction of the Uterus.

The causes of uterine spasm are very obscure; though, according to Stoltz, the predisposition exists in the organ itself. If any exterior causes can contribute to its production, they certainly must be those which have a special action on the womb: such as, improper frictions or manipulations, pulling on the cord, and the abuse of stimulating remedies, the ergot particularly. Again, the irregular contractions of the uterus are more frequently remarked after a twin labor than others. The modern authors, who have made this a subject of special study, do not fully agree with each other, in regard to the sequelæ of these irregular contractions. The different forms exhibited by the uterus in such cases have been reduced, by M. Guillemot, to two principal varieties: the one depending on the conformation of the womb, and the other developed as a consequence of the presence of some foreign

body in the viscus. The former is designated by him as the *hour-glass*, or spasmodic contraction of the neck at its internal orifice; the latter by the term *cucystment*, or the irregular contraction of the body of the womb.

We shall follow the example of M. Stoltz, by admitting four distinct varieties of uterine spasm, namely: 1st, a spasmodic contraction of the external orifice of the neck; 2d, that of its internal orifice; 3d, that of one or more portions of the body of the uterus; and, 4th, a spasmodic contraction of the whole womb.

1. *Spasmodic Contraction of the External Orifice.*—A person who has had many opportunities of observing the softness and flaccidity of the cervix uteri at its lower part after the child is born, can scarcely comprehend the possibility of spasm at its outer orifice; and hence many authors have altogether denied its existence. Besides, it must be evident that, even if such a condition were to occur, it would constitute but a momentary obstacle to the delivery of the after-birth; and therefore we would only have to wait until the spasm of the orifice had yielded to the force of the contractions. Or, if any accident should occur requiring prompt delivery, the resistance might be surmounted without difficulty.

2. *Spasmodic Contraction of the Internal Orifice.*—This is what M. Guillemot understands by the term *hour-glass* contraction of the womb; and we quote a considerable part of his excellent description of it. When the hand is introduced, the cervix is found projecting into the vagina, and so disfigured that it resembles a section of the large intestines; but about five or six inches above this, the finger is arrested by a kind of stricture, which is the wrinkled and contracted internal orifice. According to Madame Boivin, the uterine neck sometimes measures five or six inches in length and four to five in diameter, in this state of flaccidity; the cavity of the womb containing the placenta is found above the retracted part. In some instances the uterine walls are firmly contracted around this mass, whilst at others they are in a state of partial or complete inertia. The cavity of the womb is thus divided into two portions. When the upper one is contracted on the placenta, as most generally happens, its volume does not exceed the moiety of the whole organ; and hence the retraction, although seated at the internal orifice, seems to exist very near the middle of the uterus; which circumstance has induced many practitioners to suppose that they had encountered an irregular contraction of the body of the womb.

In most cases the after-birth is retained entirely within the superior cavity; but this is not always the case, for, in some instances, the vascular mass has been found strangulated, to a certain extent, by the stricture of the neck, one part being retained in the upper portion and one in the lower. Whence it may happen: 1st, that a very small portion of the placenta projects into the vagina; or, 2d, that it is strangulated near its central part; or, 3d, that more than one half of the placenta hangs down below the strictured orifice; which different circumstances, as we shall have occasion to show, modify the treatment.

The hour-glass contraction is recognizable by the shape of the uterus, and by the resistance presented at the internal orifice, both to the placenta and to the accoucheur's finger. The organ is found hard and contracted, when

felt through the abdominal walls, and all tractions on the cord prove ineffectual; besides, the operator, by resorting to the touch, will find the placenta above the internal orifice, which is contracted, whilst the walls of the neck below are soft, flabby, and pendent in the vagina; and, lastly, there is no discharge of coagula, and sometimes even no blood of any consequence escapes.

When the stricture is not accompanied by any pressing symptoms, we should wait, for the spasm generally gives way in the course of a few hours; the uterus then regains its normal form, and the after-birth is expelled. Should it persist longer than four or five hours, the opiate preparations might first be resorted to, followed by venesection, if indicated by the general phenomena of plethora; bathing might, likewise, prove very useful. But the difficulty of watching the state of the uterus during its administration must restrict its use greatly. But if, notwithstanding the employment of all these measures, the spasm does not yield, or if it is complicated by an alarming hemorrhage, we must forthwith attempt the dilatation of the strictured part. This is effected by first introducing one finger, then two, and then three, with a view of enlarging the orifice by degrees until it will admit the whole hand. The advice of M. Stoltz, to smear the fingers with belladonna ointment, might prove serviceable. Should a portion of the placenta be engaged in the retracted part, our course would evidently vary under the different circumstances alluded to above. For instance, if a very small portion only of the after-birth is engaged, the operator ought to push it up, and then penetrate into the uterine cavity, in the way just described; but if strangulated near its central part, the fingers are to be slipped up between it and the neck, and then the part that is still above the stricture is to be gradually drawn down. Again, if most of the placental mass is already clear, we must get hold of this free portion, and by compressing it forcibly in the hand, endeavor to reduce the size of the strangulated part, and thereby effect the delivery of the whole.

3. *Irregular Contractions of the Body of the Womb.*—The womb in contracting becomes accurately applied on the body contained within its cavity; and, of course, where the placenta still remains undelivered, the womb retracts upon it. As the contractions operate at all parts, the walls of this organ, being opposed to the circumference of the placenta, and, consequently, meeting with little or no resistance, gradually approach each other, and shut it up within their cavity; this constitutes the inclusion of the placenta; and it may assume two very distinct forms, to which different names have been applied, *i. e.*, the encystment and the encasement.

Encystment is that variety in which the placenta is so surrounded on all sides, excepting at the opening of the cell for the entrance of the umbilical cord, that it is absolutely imprisoned. Encasement is that in which the uterine walls in contracting upon the circumference of the placenta, constitute around its margin a kind of collar, or frame, which encases it, just as the turgid conjunctiva surrounds the cornea in chemosis.

These two species may either be partial or complete: the encystment is said to be complete, when the placenta is altogether shut up in the cell or cyst formed by the retracted uterine walls; and incomplete, where some

portion of it breaks out of the door of the cell. In this latter case, the cell is perfect, being lined throughout by the centre of the placenta, whilst the other parts of the latter, that have escaped from the cyst, are attached to the neighboring portions of the uterine walls.

The encasement is complete, when the collar formed by the retracted uterine fibres surrounds or encases the whole circumference of the placenta; and incomplete, where it only exists on a part of the periphery of this vascular mass.

In some instances, the womb is not moulded on the circumference alone of the placenta. "For if," says M. Velpeau, "the after-birth were solid and even, like the head, the womb in contracting would necessarily retain the form of a pouch; but the cotyledons, in the process of the detachment, may separate from each other, and the placenta would then offer more resistance in some parts than in others; so that the uterus soon divides into several compartments, or divisions, more or less distinct from each other, and each of which embraces some portion of the after-birth." In these cases, the hand, in effecting the artificial delivery, would necessarily have to penetrate through four, five, or occasionally even six circular strictures, after having dilated them.

FIG. 117.

The hour-glass contraction of the womb.

The encystment may be complicated by a retraction of the internal orifice (see Fig. 117); but, in most of the recorded cases of this kind, the resistance has easily been surmounted.[1]

It may take place at any portion of the womb whatever, though more rarely at the fundus than elsewhere; which is probably owing to the circumstance of the fibres in this region being more active, so that the detachment of the placenta, when it is inserted at the fundus, is accomplished much sooner.

The encystment may be recognized without much difficulty; for, by palpating the lower part of the belly, two tumors are detected just above the pubis, formed by the body of the uterus; the larger of which contains the after-birth, and the other, placed below or towards one side, and joined to the first by a kind of neck, constitutes the remainder of the uterine globe. And, by following the cord with the index finger up into the cavity, we find its lower portion but little retracted; and beyond it are the irregular walls of the cyst, inclosing the placenta.

FIG. 118.

Here, also, the accoucheur ought to wait, if the encystment is not complicated by any accident; endeavoring, however, in the meanwhile, to fix or the retraction of the womb

[1] Central constriction, such as represented in the figure, has given rise to much discussion.

to its normal form, by a resort to the measures before advised. When any danger threatens the mother's life, he ought to dilate the orifice of the cyst with the ends of the fingers, and thus penetrate carefully into its cavity. (See Fig. 118.)

While these attempts are being made internally, the other hand, placed on the hypogastrium, must grasp the fundus, and keep it in position. Douglass, who devoted particular attention to this subject, avers that the placenta is generally still adherent; but Ramsbotham, Dewees, and several others assert, on the contrary, that it is usually detached. In the former case, the operator would have to attempt its separation; always taking the precautions mentioned below. It is to be delivered by taking hold of one border, with a view of making it clear the mouth of the cyst more readily; and if it is but partially encysted, the index finger is entered and passed around that portion of the placenta held by the periphery of the opening; in this way both relieving the stricture and disengaging the encysted part.

Instead of attempting to dilate the mouth of the cell, which is often very difficult, M. Dubroca, of Bordeaux, has suggested a new plan, which is styled by him the *method of erosion;* it consists of the introduction of a finger into the opening of the cell, and then, with it, tearing up and reducing the placenta to fragments, which are afterwards expelled. He says this mode proved successful in some instances in which he could not succeed in passing two or three fingers into the cyst in the usual way.

4. *Spasmodic Contraction of the whole Organ.*—M. Stoltz relates an instance in which he was called to a woman who had been delivered an hour previously, by a midwife, after the administration of two scruples of ergot; the midwife, being unable to extract the after-birth, thought proper, before sending for him, to exhibit a sixth dose of eight grains. On his arrival, he found the woman's general condition favorable; the fundus of the uterus extended nearly up to the umbilicus, and the entire organ was developed as much as at the fifth month; but its walls were contracted to such a degree that it was quite firm and hard. Following up the cord, the index finger reached the external orifice, which was greatly retracted, and scarcely permitted the introduction of the first phalanx; every part of the womb within reach was firm and contracted, just like the fundus and body. Of course, the delivery of the after-birth was out of the question; besides, no complication indicated its necessity. It was then about half-past two o'clock in the morning; a draught, consisting of half a drachm of Hoffmann's anodyne liquor, and twenty minims of the common tincture of opium, was administered. The fundus of the womb did not seem to be any less contracted at nine o'clock in the morning; but, by operating with care, M. Stoltz succeeded in dilating the orifice, and in passing three fingers up to the root of the cord; but being unable to get any further, he withdrew his hand, and directed injections of a decoction of belladonna and hyoscyamus. These were repeated every half hour, and at the fifth injection the midwife found a portion of the placenta engaged in the vagina; she forthwith drew upon it, and succeeded in extracting it, twelve hours after the child's birth. Should a similar case again occur, the prudent course of the Strasbourg professor ought certainly to be followed. In addition to which, venesection, tepid bathing, &c., might be resorted to, if indicated by a plethoric condition of the patient.

[Although spasmodic contraction of the entire uterus, the external orifice included, is rare, tetanic spasm of the internal orifice and of the body, the external orifice remaining very dilatable, is not an uncommon event. Whatever hinders the expulsion of the placenta, all obstructions causing it to be retained too long in the uterus, predispose to spasmodic contraction of the organ. What, however, occasions it oftener than anything else is the untimely administration of ergot. In all cases of the kind which I have witnessed, it appeared to me that the fundus of the womb was very high up, as though the body of the organ had become elongated by a moulding process upon the strongly compressed placenta within it. Therefore, when one is so fortunate as to succeed in dilating the internal orifice with one or two fingers, it is necessary to pass them very far up in order to reach the highest part of the placenta, which they are then to be hooked around in order to its withdrawal. Such is the process to which we give the preference.]

On the whole, then, it would appear that the irregular contraction is generally partial, though it may be seated at any or every part of the organ; and further, that all these cases are to be treated in the same way. That is: 1st, to wait patiently; 2d, in the course of a few hours to resort to frictions over the fundus, to titillations of the os uteri, and opiate preparations by inunctions or injections, belladonna to the cervix, either in the form of extract or decoction, venesection, and general or local bathing. Burns recommends the sudden application of cold compresses. In most instances, the administration of antispasmodics by the mouth, such as sulphuric ether, hyoscyamus, belladonna, or opium, is of unquestionable service; and 3d, when there is any complication that endangers the patient, the forced, though slow, gradual, and careful introduction of the hand, and extraction of the placenta.

It is held by most obstetricians of the present day that irregular and spasmodic contractions of the uterus and partial or complete retention of the placenta are of less frequent occurrence, since the method of placental expression by the so-called *Credé* method has been more generally practised. Rigby says the most frequent cause of irregular contractions "is from over-anxiety to remove the placenta: the cord is frequently pulled at." Playfair, in speaking upon hemorrhage after delivery, says "if placental expression were always employed —if it were the rule to effect the expulsion of the placenta by a *vis à tergo*, instead of extracting by a *vis à fronte*—I feel confident that these irregular and spasmodic contractions, of the influence of which in producing hemorrhage there can be no question, would rarely, if ever, be met with."

§ 5. Abnormal Adhesions.

In the present state of our science, it is very difficult to point out a satisfactory cause for these abnormal adhesions of the placenta. According to most authors, they are owing to a fibrous transformation of the cellular filaments which hold the placenta and uterus together, whereby they acquire a degree of solidity sufficient to withstand the uterine forces. These adhesions[1] have also been referred to the degenerations of the placental tissue

[1] Dr. Dubois furnishes an instance of an abnormal adhesion of the placenta [illegible] the latter was covered by an osseous [illegible] substance. Dr. Gibson, who reports the case, further remarks, that he found the placenta partly ossified three times in the same woman, and that he never had any difficulty in detaching the latter.

Monro and Merriman also met on several cases where they noticed patches of ossification on the uterine surface of the placenta.

itself, as well as to various osseous and calcareous concretions. In a case detailed by M. Stoltz, the bond of union was evidently formed by a layer of coagulated blood, which had served to arrest a hemorrhage at the fourth month of gestation. Dubois appears to accept this view, and attributes these adhesions to patches of a whitish matter of a greater or less degree of hardness, evidently of a fibrinous nature, and increasing in density with the age of the sanguineous effusion of which they are the only remains. Sometimes it is only produced at a few points of the uterine surface of the placenta, by the conversion of some part of the organ into a non-vascular, cellulo-fibrous tissue, by the accidental atrophy of one or more of the placental cotyledons; which atrophy not unfrequently occurs. The generally received opinion is, that these abnormal adhesions result in consequence of an inflammation of the placenta, or of the uterine wall during gestation, which is terminated by the exudation of plastic and coagulable lymph between the contiguous surfaces. Our own belief is, that these adhesions are caused by the fibro-fatty degeneration and atrophy of the villi of the chorion and of the cotyledons which they form. (See *Fibrous Lesions of the Placenta.*—*Diseases of the Placenta.*) But whatever may be the cause that produces such adhesions, there are certain persons who appear to have an unfortunate predisposition to them, since they suffer from this accident at every confinement.

The adhesion may be more or less extensive; sometimes existing over the whole placental surface, but at others restricted to certain parts; for instance, it may exist at the margin or circumference of the after-birth, the centre being detached; or it may be restricted to one or more points of its surface. It likewise offers various degrees of resistance; occasionally being feeble enough to yield readily, even to moderate tractions; though it is sometimes so strong that either the placental or the uterine tissue yields rather than the bond of union. In some instances, the adhesions are so firm that they cannot be broken up without the greatest difficulty, even after death. For example, Morgagni found a portion of the detached placenta hanging in the uterine orifice of a woman, who died thirteen days after her confinement; but the other part of it was so adherent that he could scarcely separate it with a scalpel. The adherent portion was indurated, and some traces of inflammation were found on the corresponding part of the womb.

Whenever a considerable period of time has elapsed after the labor, without the delivery of the after-birth being effected, and yet the globular form of the uterus,[1] its hardness and manifest contraction, clearly show that it is striving to detach and to expel the secundines, and where the finger, passed through the cervix uteri, does not detect the placenta, we have every reason to suppose that there is an unnatural adhesion of this mass. The following signs will then confirm our suspicions: after drawing on the placenta by means of the cord, the latter will be found to mount up as soon as it is relaxed; during the contraction, the uterine globe becomes harder and diminishes in volume, but after the pain is over, it returns to its former condition much sooner and more perfectly than in other cases; and, lastly,

[1] I think, says John Ramsbotham, that I have observed a slight alteration in the shape of the uterus. It presents a less regularly spherical form, and its fundus also exhibits a certain degree of conicity. (*Obs. on Midwifery.*)

the existence of this complication is rendered unequivocal by carrying the hand up into the uterus.

The abnormal adhesions of the placenta may exist alone, or they may be complicated with some accident; its partial adherence is nearly always accompanied by a more or less profuse hemorrhage. In cases of simple adhesion, the accoucheur should always wait, for a delay of a few hours is often sufficient to effect the separation; then, after waiting for a couple of hours, the uterus is stimulated to contraction by the various means before indicated; but if these prove insufficient, an injection of cold water is to be thrown into the umbilical vein. After having cut the end of the cord, and squeezed the vein so as to free it entirely of any blood it may contain, the cold liquid is injected into this vessel with a sufficient degree of force to diffuse it throughout the placental mass. This ought to be repeated, taking care to retain the fluid in the after-birth for several minutes by securing the cord. This injection evidently has a twofold operation, affecting both the placenta and the womb; that is, it distends the former by the introduction of a new liquid into its vessels, thereby augmenting its size and weight; and the impression of cold on the internal surface of the latter brings on its contraction. This measure, therefore, ought not to be overlooked.

Where it fails, tractions on the umbilical cord are to be resorted to; though always, as advised by Levret, perpendicularly to the surface of the placenta. If two sheets of moistened paper are stuck together, continues this author, for the purpose of illustrating the importance of his precept, and you endeavor to separate them by sliding one over the other, that is to say, by drawing them parallel to their planes, you tear rather than detach them; whilst, by pulling perpendicularly to those planes, you will separate them without the least effort, as also without any laceration. In order to obtain a similar result in practice, the umbilical cord is carried towards the side not occupied by the placenta, by the intervention of two fingers passed into the vagina beyond the uterine orifice. But it is impossible to carry out this rule, as Velpeau and Guillemot justly remark, because both the fœtal and the uterine surfaces of the after-birth are in contact with the walls of the organ; besides, the fingers can only sustain the cord below the cervix, and hence, as a natural consequence, the cord will always be parallel with, not perpendicular to, the long axis of the womb, in whatever manner it be held. The same effect is produced equally well, in their opinion, by drawing on it without this artificial pulley. Though whichever plan be resorted to, the operator must never exert force enough in making the tractive efforts to rupture the cord, and he should desist as soon as he finds it yielding.

But, supposing all the local and general irritants, the injections into the umbilical vein, and the tractions upon the cord just recommended, have proved ineffectual, what is to be done? When the adhesions are complicated by any hemorrhagic or convulsive affection, all accoucheurs are harmonious on one point, namely, to persist in the attempts to effect the extraction. But the same unanimity does not exist with regard to cases of simple adhesion; for some, dreading the disastrous phenomena that may result from the retention and subsequent putrefaction of the placenta, and [illegible]

putrid matters, are in favor of terminating the delivery at every hazard; while others, on the contrary, fearing still more the consequences of the manipulations which are necessary for effecting the detachment of the placenta, advise us to abandon the whole to nature; at the same time recommending the ulterior symptoms to be met and combated as they arise by the appropriate measures.

Our own opinion is, that the course of Levret, of Baudelocque, of Desormeaux, and M. P. Dubois, is the best adapted to cases of this kind; that is, after having employed the various means we have spoken of, to introduce the hand into the uterine cavity, following the cord, which is then the best guide up to the placenta. Should this have been torn away, the latter could be recognized by the vascular ramifications which characterize its fœtal surface, by its elevation above the inner face of the uterus, by its consistence, and by the dull sensation felt by the patient when the fingers bear upon it. The point of attachment being discovered, the next step is to ascertain whether the adhesion is complete or partial; in the latter case, it is recommended to insinuate the open hand between the external surface of the placenta and the uterine wall, and then slit up the adhesion with the finger, just as you would cut the leaves of a book with a paper-knife; (Fig. 119.) It is certain, however, that it is a piece of advice which it will be found impossible to follow. M. P. Dubois thinks it is better to seize the detached part with the whole hand, and pull upon it, with a view of completing the separation of the rest; but if this proves unsuccessful, he next tears and brings away all the lose portion. These abnormal adhesions are most readily overcome by a short scratching motion with the ends of the fingers. All attempts of this kind ought, however, to be made with great caution: leaving the ulterior expulsion of those parts that still remain adherent, to nature, without resorting to any further attempts. We could bring forward numerous cases in proof of the soundness of this precept. For example, we have known a rash operator to perforate the uterus completely whilst striving to separate an adherent placenta: and Leroux, of Dijon, notwithstanding all his dexterity, had the misfortune to detach quite a considerable part of the internal muscular plane, in a case of partial adhesion, by pulling too strongly on the detached upper portion of the after-birth, in order to separate its still adherent lower part. Death soon followed in the case we allude to; and the surgeon of Dijon had a profuse hemorrhage to encounter in his, but he fortunately succeeded in arresting it by the application of the tampon.

Fig. 119.

Mode of breaking up the adhesions of the placenta.

When the placenta becomes separated at its central part, the margins being still adherent, a cavity is usually created at that point, in which the blood accumulates. Under such circumstances, the centre of the mass may be perforated, and the fingers be passed up through the opening, to complete

the detachment; at least, such was the course adopted by Heister and Leroux. Furthermore, where the placenta is adherent throughout, the accoucheur operates on its external face, by slipping up the hand behind the membranes; and when it reaches the circumference of the after-birth, he first endeavors to detach one part, and, where successful, he pursues the same course as if it had originally been a case of partial adherence.

Finally, let us add, that it is not proper to persist too long, when a part, or even the whole, of the placenta holds out against the properly conducted manipulations just advised; for its expulsion will probably take place sooner or later, either all at once, or in fragments.

[The membranes, as well as the placenta, sometimes become abnormally adherent at some points of their surface, and the difficulty thus occasioned may be recognized in the following manner. At first, all the phenomena of the delivery of the placenta take place as usual, and the detached placenta is forced down upon the internal orifice or into the upper part of the vagina; but from thence it is with difficulty brought to the vulva. It is found to resist the tractive effort, to be held back, as it were; and if a finger be passed behind the symphysis pubis, the membranes are found to be in a state of tension. Any sudden application of force would inevitably extract the placenta, but at the same time would leave a portion of the membranes in the cavity of the uterus. In order to avoid so unfortunate a result, it is important to temporize, to draw very gently but continuously upon the membranes, and also rotate the placenta so as to twist them and give them greater power of resistance. Finally, if necessary, the hand may be passed into the vagina, and by following up the membranes the point of adherence may be reached and detachment accomplished. Although retention of a shred of membrane is a less serious occurrence than retention of a cotyledon of the placenta, it may, nevertheless, give rise to secondary hemorrhage. (See *Secondary Hemorrhage.*)]

§ 6. Of Partial and Complete Retention of the Placenta.

By conforming to the rules just mentioned, we shall rarely fail in extracting the placenta completely; but we have seen that there are nevertheless some cases in which a larger or smaller portion of the after-birth is necessarily left behind, and its expulsion confided to the resources of the economy. Whether this abandonment be obligatory, or the result of ill-directed tractions on the cord, or of improper attempts to effect the separation of the adherent placenta, it may lead to various consequences, some of which are very serious. It is, therefore, very important to determine the fact, which may almost always be done by a careful examination of the placenta. The only difficulty which could arise, would be occasioned by its separation into fragments in consequence of its very close adhesion.

A. *Hemorrhage* is almost always the immediate consequence of the retention of any considerable part of the placenta, and its amount is generally proportionate to the size of the abandoned portion. Sometimes, however, no flooding occurs; either because the uterus contracted properly after the separation of the placenta, or because the fragments left behind remain attached to the walls of the organ. In the former case, the contraction of the womb diminishes the discharge after the lapse of some hours; and during the few succeeding days, excepting the violent colicky pains occasioned by the efforts of the uterus to expel the foreign body, the patient suffers little more than the discomforts attendant upon a moderate hemorrhage.

It is not long, however, before these frequent after-pains seem to give rise to an unusual tenderness of the uterine tumor; and, finally, even slight pressure becomes painful. The lochia, which hitherto were composed entirely of blood, present a different character. They are mixed with a very fetid, sanious fluid, and become very irritating to the genital parts. If the temperature should chance to be high, and especially if the most scrupulous regard is not paid to cleanliness, they diffuse such a disgusting odor as to render the chamber untenable; and, as M. Jacquemier observes, the assistants are liable to suffer severely from it.

This change in the lochia is due to the putrefaction of some portions of the placenta. As parts of the adherent mass become gradually detached, they fall into the cavity of the uterus, where they are liable to remain for some time. The contact of air which readily reaches the uterus soon gives rise to putrefaction, and the decomposed fragments communicate to the lochia the odor which characterizes them.

B. *Putrid Absorption of the Placenta.*—These local phenomena rarely appear without being accompanied by a sensible alteration of the general health of the patient. After a longer or shorter time, a violent chill comes on, attended with extreme restlessness and anxiety, the pulse becomes rapid, and the skin dry and burning; the face is alternately pale and flushed, though mostly pale; the respiration is anxious and frequent; the tongue, which is always dry, is sometimes white and sometimes red; the patient complains of pain in the head, attended occasionally with throbbing, and soon delirium, at first intermittent and finally constant, is added to the other symptoms. The latter become more and more serious; the abdomen is distended and very tender; inclinations to vomit, sometimes even profuse vomiting, and, occasionally, frequent and involuntary alvine discharges, show that the alimentary canal shares in the general affection. Finally, the pulse becomes more and more rapid, thread-like, and undulating; the debility and restlessness are extreme, there is no cessation of delirium, and death closes this terrible scene five, ten, or fifteen days after the invasion of the first symptoms.

Peritonitis, which is in some cases indicated by the tenderness and distention of the abdomen, does not always occur, and death may result simply from the species of poisoning occasioned by the absorption of the putrefied fragments of the placenta. The symptoms presented by the patient are then simply those of the fevers commonly called adynamic and ataxic.

The result is not necessarily fatal, and especially when the disease is uncomplicated with peritonitis, the patient may escape from the danger which threatened her.

After a certain length of time, the retained portion of the placenta may become suddenly detached, and be expelled bodily; upon which, the grave symptoms to which its decomposition had given rise, cease almost immediately.

Sometimes, and under the use of frequent injections, the discharge seems to lose its fetidity and irritating qualities, and becomes more decidedly purulent. Some detached portions of the placenta are found diffused in it, and parts are also brought away by every injection; rather larger portions

occasionally present at the cervix and may be extracted with the finger. Whilst the womb is thus ridding itself of the putrid matter which it contains, the general symptoms improve, or, at least, are not aggravated. The economy seems to resist the deleterious influence to which it is subjected. The patient may remain in this condition for several weeks with an almost constant febrile movement, accompanied now and then with exacerbations preceded by slight chilliness, and moderate disorder of the digestive apparatus, until, finally, when the remainder of the placenta is expelled, the fever ceases, the strength returns, and the patient is restored to health.

These serious accidents, which are always to be feared when a considerable portion of the placenta is retained within the womb, do not, however, always result from this retention. It may remain there for a long time after the delivery without seriously affecting the woman's health, and be disposed of in two different but equally strange ways. I allude to the late expulsion and absorption of the placenta.

c. *Late Expulsion of the Placenta.*—The retention of a portion of the placenta is almost always attended by a profuse hemorrhage. This, however, does not invariably occur when the entire after-birth remains in the cavity of the uterus, which rarely happens except after abortions. If, in short, the adhesions are nowhere destroyed, and the utero-placental vessels are unruptured, the reason of the absence of hemorrhage, and often even of the lochial discharge observed under these circumstances, is evident. The flooding then comes on only when the uterus at last contracts in order to expel the foreign body.

This expulsion may be accomplished at once, and the completely separated placenta be discharged whole. The hemorrhage, which had lasted four, five, or even ten days, being the time sometimes necessary for its separation, ceases immediately after, as by enchantment. This hemorrhage is always far less profuse when the detachment of the placenta takes place at a remote period from the expulsion of the child. The constant contraction of the uterus, which tends unceasingly to resume the dimensions of the unimpregnated condition, necessarily lessens the calibre of the vessels and almost obliterates them, so that their rupture at that time is an affair of little moment. On examining the placenta, it is found to have undergone no alteration, it exhales no unpleasant odor, and although it may have remained several days, weeks, or even months, in the cavity of the uterus after the expulsion of the child, it is as fresh as though the latter were just born. Its vitality had been preserved by the integrity of its vascular connections, and its prolonged retention been thus rendered innoxious.

I have just had occasion to notice a case of the kind, afforded by a young woman three months and a half gone, who miscarried twenty-four days ago. The placenta had remained since then within the cavity of the uterus, and a profuse hemorrhage having occurred in consequence of its detachment, I was obliged to extract it artificially. It was already engaged in the cervix, and its withdrawal presented no serious difficulty; the extreme weakness of the patient forbade temporizing. It had no appearance of decomposition.

[I met with two similar cases in women who were delivered at term. A portion of the placenta having been left in the womb, both of them were taken with severe hemorrhage; one on the ninth and the other on the seventeenth day. In both cases, I found the os uteri partially open, enabling me to extract a cotyledon on the placenta which presented not the slightest evidence of putrefaction.]

Unfortunately, the slowness with which the detachment of the placenta sometimes takes place, may so prolong the discharge as to give rise to another accident. When, in fact, a cotyledon is thus separated, it no longer shares in the circulation of the adhering parts, and remains suspended within the cavity of the womb. After a time, it becomes detached from the rest of the placenta, and if its size or the contraction of the orifice prevents its being discharged immediately, it decomposes, and may give rise to some of the accidents already mentioned. Generally, however, its expulsion is not long deferred, or else the practitioner deems it proper to extract it; still, it is impossible to avoid the hemorrhages, the repetition of which on the occasion of each partial separation at last weaken the patient greatly, and may even endanger her existence.

D. *The complete absorption of the placenta* is so extraordinary a phenomenon, that the first observations published were received very doubtfully. Nothing short of the great authority of such names as that of Nægèle, together with the strict detail with which the cases are related, were required to obtain for them a place in obstetric science. Yet it is so easy to be deceived in such cases, that even after the observations of Nægèle, Salomon, and Velpeau, doubts will occasionally suggest themselves. Is it not possible, indeed, that, notwithstanding the strictest surveillance, the placenta might have been expelled unconsciously? Is it not possible that the species of sanious detritus, to which its decomposition gives rise, may have formed a part of the putrescent lochia discharged in such cases? Finally, may it not have been that its prolonged retention and late expulsion were regarded as instances of absorption? In fact, that after a woman had thus retained her placenta for several months without her health having suffered materially, it may have become detached without a great deal of hemorrhage, and small and shrivelled as it was, have been discharged during strainings at stool without the patient herself being aware of it.

Most of the published cases are, doubtless, liable to one or the other of these explanations; yet it must be confessed that there are others, in which there would seem to be no doubt that the placenta had really been absorbed. After all, analogous phenomena are not wanting. In extra-uterine pregnancies, has not the fœtus often been found reduced to its bony portions, in consequence of the absorption of the other fluid or solid parts? Has not the same thing been known to take place within the uterus when a dead fœtus had been retained for a long time? The absorption of a placenta is certainly not more wonderful, especially in cases of abortion, when the placentas are small and imperfectly formed, as in most of the instances mentioned. The possibility of the occurrence cannot, therefore, as yet be absolutely denied, though it should be received with a certain degree of reserve.

Indications.—We have dwelt sufficiently upon the proper means of preventing the entire or partial retention of the placenta, and have but a word

to add respecting the prudence which should govern all attempts at extraction. Although the dangerous accidents to which the woman is exposed, require that we should attempt all that is humanly possible, in order to effect its extraction, it should be remembered that too long-continued efforts, whether to introduce the hand through a contracted orifice, or to rupture the too strong adhesions, are liable to produce equally serious consequences; in fact, that post puerperal inflammations and even ruptures of the uterus have frequently resulted from these forcible detachments; and, finally, that a placenta retained wholly or in part within the uterus, may not be expelled until after the lapse of several months, or may be absorbed without sensibly affecting the health of the mother. Although these latter occurrences are rare, they are yet sufficient to justify, and even require the relinquishment of all violent and dangerous efforts. It were impossible to furnish here an absolute rule of action, and it must be left to the intelligence and prudence of the practitioner, to determine how far he shall proceed in such cases.

The indications to be fulfilled, when a portion of the placenta has been left behind, either voluntarily, or through awkwardness, vary according to the period at which our services are demanded.

Very often a quite profuse hemorrhage is the first accident to appear, and efforts should be made to restrain it by means of cold applications to the hypogastrium, groins, and thighs, by frictions upon the body and neck of the uterus, and, with the object of obtaining a more thorough contraction of the organ, ergot should be administered. These measures will very rarely be found insufficient, provided the uterus is properly contracted; but should the accident be complicated by inertia, the measures to be indicated hereafter should be resorted to.

Care should be taken as regards relieving the violent after-pains which torment the patient, by the use of opiates, since the contractions of which they are the result, tend to separate and expel the adherent mass.

The ulterior conduct of the practitioner must be governed by circumstances. If the neck of the uterus appears to be strongly contracted, if the lochia are moderate in amount, and especially if their composition is unaltered and their color and smell unchanged, he should be satisfied with watching the patient closely without interfering with the tendencies of nature by an untimely intervention.

As soon as the lochia become sanious and fetid, he should resort to the best means of averting their dangerous influence upon the economy. Intravaginal and intra-uterine injections practised frequently, and continued until the returning fluid is no longer imbued with the odor of decomposition, are very useful. M. Vullyamos recommends the use of large quantities of water; he throws up an injection consisting of the warm infusion of marshmallows, by means of a large syringe, every five minutes; he prefers cold water, however, in cases of flooding. This operation is effected by the use of a long gum-elastic tube, one end of which is fixed in the uterine orifice, and the other extends beyond the vulva, or even the foot of the bed, so as to obviate the necessity of uncovering her; the returning fluid is collected in a basin placed under the patient. I think it would be more prudent to make use of a double tube.

The patient should also be examined frequently, in order to ascertain whether any portion of the placenta presents at the cervix, and if so, it should be extracted immediately, either with the fingers, with Levret's abortion forceps, or with Prof. Pajot's curette. The injections, indeed, are not always sufficient, being incapable of bringing away moderate-sized fragments.

Extreme fetidity of the lochia might possibly authorize the use of slightly chlorinated injections, or warm injections of dilute carbolic acid and glycerine, as elsewhere recommended.

The patient should also have the advantage of the best hygienic measures. The chamber should be thoroughly ventilated and purified by every appropriate means, and the linen changed as often as possible.

If, notwithstanding these precautions, upon which too much stress cannot be laid, symptoms of general infection should appear, complicated with peritonitis, purgatives, baths, calomel, and mercurial inunction, should be used at the outset; but the first adynamic or ataxic phenomena must be met with the tonic and stimulant treatment used in the latter stages of low fevers.

ARTICLE II.

OF ACCIDENTS THAT MAY COMPLICATE DELIVERY OF THE AFTER-BIRTH.

The principal of these are hemorrhage, inversion and rupture of the womb, and convulsions.

§ 1. Hemorrhage.

Of all the accidents that may precede, accompany, or follow the delivery of the placenta, flooding is certainly one of the most frequent, and at the same time, most terrible in its consequences. It may occur conjointly with either of the difficulties just described in the preceding article; and when this does take place, the indications then laid down ought to be followed up more promptly. But, in addition to those circumstances, hemorrhage may likewise take place after the child is born; and this claims our special attention, since it is nearly always accompanied by complete or partial inertia of the womb. We have therefore to examine successively the causes, symptoms, diagnosis, prognosis, and treatment of this inertia, considered with particular reference to the accident in question. We shall thus complete the history of puerperal hemorrhage, which was hitherto only described in part; namely, during the first six months, in the article on *Abortion;* and during the last three months, as also pending the labor proper, in that on *Accidental Dystocia.*

A. *Causes.*—After the delivery of the child, and even during the progress of its expulsion, the uterine tissue becomes gradually retracted by the exercise of its contractility of tissue, whereby the cavity of the organ is considerably diminished; thus contracting the vessels that ramify in the substance of its walls and reducing their calibre in a greater or less degree, thereby interrupting the circulation, and of course preventing the utero-

placental vessels, which are torn by the detachment of the placenta, from becoming the source of a profuse hemorrhage. Now, under certain circumstances, this contractility of tissue is very feeble, and in others it is altogether wanting; in the former case the inertia of the womb is partial, in the latter it is complete; again, it may be total or partial, according as it affects the whole or a part of the uterine walls. All which various degrees of the affection may be developed under the influence of the same causes.

The causes of hemorrhage from inertia are either predisposing or determining; under the former head, writers have enumerated: 1st, a plethoric and sanguine habit, a precocious and usually copious menstruation; more particularly when venesection has not been resorted to in anticipation, during the latter months of pregnancy; 2d, a lymphatic temperament; for those women who have a soft and lax fibre, or possess but little muscular power, and who are nervous and irritable, are more liable than others to this affection; 3d, the occurrence of profuse flooding after former labors. We might bring forward numerous cases, all tending to prove the unfavorable influence of previous floodings; and, therefore, from the mere fact of their occurrence at one or more antecedent labors, the accoucheur ought to take suitable measures to prevent their reappearance.

Under the head of the so-called determining causes, we may classify: 1st, the exhaustion incident to a protracted and painful labor; or, in other words, all the obstacles that may oppose the natural delivery of the fœtus; 2d, a very short labor, and its rapid termination from the *stupor* of the walls, caused by the rude and hasty depletion of the organ; hence a very large pelvis, a laceration of the cervix, and a want of resistance at the perineum, all which facilitate the rapid expulsion of the child, may, from that fact alone, become sources of inertia; 3d, an excessive distention of the womb, whether dependent on a dropsy of the amnios or a twin pregnancy, may paralyze, as it were, the contractility of the uterine tissue; 4th, according to Madame Lachapelle, we must further add a dragging of the uterus, in consequence of an adhesion contracted with the omentum during gestation; whereby the perfect retraction of the organ after labor is impeded.

There can be no doubt that the various circumstances just alluded to may of themselves give rise to inertia; but, as a general rule, their influence will be of short duration and easily set aside, if it is not favored by the existence of some predisposing cause. It is to the latter, especially, as M. Guillemot observes, that we must refer the chief part in the production of those hemorrhages that occur after the child is born. In fact, where they exist conjointly in the same woman, there is every reason to fear the occurrence of that accident; whilst, if absent, the supposed determining causes usually have but little or no effect.

The influence of those causes is ordinarily manifested in the course of a few minutes after the child is born; though sometimes the inertia is secondary, as it were, not coming on for several hours, or even not until several days afterwards. The womb having contracted properly immediately after the delivery of the child or afterbirth, then becomes relaxed by degrees, and ultimately gives rise to a frightful hemorrhage.

B. *Symptoms.*—Where the uterus contracts properly as soon as the labor

is over, a hard, globular, rounded tumor is found in the hypogastric region, occupying nearly all the space between the umbilicus and pubis. This tumor is the seat of intermittent pains of variable intensity, and is always harder while they last. An absence of these characters indicates inertia of the organ; that is, by palpating the lower part of the abdomen, we find nothing but softness and flaccidity throughout; for the abdominal and uterine walls are so easily depressed, that they can be pushed back against the posterior ventral parietes; and, indeed, where the inertia is complete, it is even impossible to make out which are the uterine and which the abdominal walls. Again, by carrying the hand up into the womb, it readily passes through the relaxed cervix, and finds the uterine parietes everywhere flabby and wrinkled like a bit of old rag. Should the inertia be partial, the uterine structures seem to be thicker, and to have a more marked consistence; but they are still readily distended, and are far from offering their characteristic resistance.

This condition may exist without hemorrhage, if the placental adhesion still remains intact at every part of its uterine surface; but whenever a separation has occurred, flooding is clearly inevitable. Of course, the latter will be the more copious as the detachment is nearly or wholly completed at the time the inertia is manifested.

The signs by which the existence of hemorrhage is recognized are easily made out; but the discharge is sometimes so sudden and profuse, that it is not detected until the woman's life is already seriously endangered. The patient generally complains of a feeling of weight about the stomach; and, soon after, pallor of the face, dimness of vision, smallness of the pulse, weakness, syncope, and all the most alarming general symptoms are manifested. To these are added some phenomena peculiar to the uterine discharge; such as, pains in the loins, a spasmodic chill, and a dragging sensation at the epigastrium, sometimes resembling that caused by hunger; and, in the latter moments, there not unfrequently comes on a hysterical attack, or even some convulsive movements. As regards the local signs, they are variable; and hence, in this respect, the flooding has been characterized as the external and the internal. When it is external, the blood, which inundates the patient's bed, soaks through the mattress, and trickles down on the floor, cannot possibly permit any mistake as to the cause of the general phenomena just indicated. But when it accumulates in the uterine cavity, the nature of the accident may escape detection, or at least may only be recognized when it is too late to remedy it.

Every circumstance whatever that constitutes an obstacle to the ready discharge of the blood through the uterine orifice, may give rise to an internal hemorrhage; thus, a very considerable obliquity of the womb, in which the neck is carried high upwards and backwards; occlusion of the os uteri, by a part or the whole of the placental mass, or by large coagula; a badly applied tampon, or the closure of the vulva by cloths; a spasmodic contraction of the os uteri, (although, in cases of inertia, this contraction is seldom considerable enough of itself to obliterate the outlet,) must necessarily favor the formation of a clot that might easily block up the already diminished cervix. Let us add further, that the elevated position in which

the pelvis is designedly placed for the purpose of arresting an external discharge, may prove a cause of internal hemorrhage.

Whenever any obstacle prevents the escape of the blood, the latter accumulates within the uterine cavity, the walls of which readily yield to distention. If the hand be then placed on the belly, the womb will be found much enlarged, occasionally even attaining the height it had during the latter months of gestation; the ball, formed by the retracted organ, is no longer felt at the usual place, its volume has increased, but its hardness has decreased; the finger in the vagina finds the uterine orifice, which is carried far backwards or is spasmodically retracted, obstructed by the placenta, or by a clot; and when passed up into the womb, it detects there a large quantity of coagulated and fluid blood. (*C. Baudelocque.*)

c. *Diagnosis.* — It is scarcely possible to mistake the nature of the accident, when the hemorrhage is external; but this is far from being the case when the blood accumulates in the uterine cavity; for, although we have enumerated the general debility, syncope, &c., and the enlargement of the abdomen, as pathognomonic signs of flooding, yet these circumstances may all be met with and still there may be no hemorrhage.

The increased size of the belly may be owing to the fact that the intestines, after having been so long compressed by the developed organs, become expanded by the gas they contain; and thus cause the abdominal walls, which are still soft and flabby, to swell up nearly to their previous size. But any errors from this source will be corrected by the resonance of the abdomen on percussion, by the vaginal examination, and by palpating the uterine globe.

"Sometimes," says Madame Lachapelle, "owing to the extensibility of the vagina, the womb is carried up by the distended bladder filled with urine, thereby singularly augmenting the size of the belly. In one instance that came under my notice, the pupils had become much alarmed by this circumstance; but I relieved their anxiety in a moment by the introduction of the catheter. For the prominence of the bladder, which is so easily recognized by an experienced person, satisfied me at once as to the nature of the case; and, besides, it was not accompanied by any of the general symptoms of flooding."

The accoucheur ought also to bear in mind that a syncope, occurring after childbirth, does not always depend on the loss of blood. It is not unfrequently observed shortly after very rapid labors; for then the womb being emptied at once, the compression to which the hypogastric vessels had been subjected during the latter months of gestation is suddenly removed; the circulation in them becomes free and unobstructed, and the rapid determination of the blood from the head and upper extremities, towards the vessels of the lower parts, often gives rise to fainting. When it occurs, the horizontal position and the application of a moderately drawn bandage around the belly, are usually sufficient to relieve the affection.

An hysterical attack, coming on immediately after the labor, might be mistaken for those nervous phenomena that so often signalize the unfavorable termination of grave hemorrhage.

But in all such cases, by resorting to the vaginal touch, and the palpation

of the hypogastric region, the accoucheur will clearly ascertain the retraction of the organ; and, therefore, will not be likely to confound them with the symptoms dependent on inertia of the womb.

D. *Prognosis.*—Flooding after labor is an exceedingly dangerous accident; for a few minutes may decide the woman's fate. Of course, the discharge will be the more profuse as the inertia is more complete and the separation of the placenta more advanced. Other things being equal, an internal hemorrhage is more dangerous, as a general rule, than an external one: simply because it is more apt to escape detection.

Of the symptoms that are common to both varieties of flooding, there are some which more particularly indicate the imminency of the danger, and even a speedy death; such, for instance, as severe chills or convulsions, increasing dyspnœa, prolonged syncope, sharp and continued pains in the loins, together with vertigo and loss of vision.

"It should also be remarked that the pupil is usually dilated, that it is at times agitated by oscillatory movements, and that the dilatation is particularly evident when the syncope is most profound." (*Lachapelle.*)

E. *Treatment.*—The treatment of uterine hemorrhage from inertia is either preventive or curative.

The preventive treatment consists in breaking up the predispositions just alluded to, and in preventing the action of those causes which might determine inertia of the womb after labor. In women of a full habit, whose menstrual discharges have usually been copious, and in whom plethoric phenomena become manifested during pregnancy, it would be proper to resort to repeated blood-lettings in the course of the latter months; and, even during the labor, if the fulness of the pulse, headache, and flushing of the face, seem to require. In those of a feeble and delicate constitution, who have suffered from flooding in their former labors, measures calculated to arouse the contractility of the uterine tissue ought to be employed in the latter stages of parturition; that is, to stimulate the action of the uterus by external frictions and pressure, by the application of compresses soaked in some cold fluid acidulated with vinegar, over the belly, and more especially, by the exhibition of fifteen to thirty grains of ergot, divided into three doses, about twenty minutes or half an hour before the child is born.

Dr. Robert Lee (*London Med. Gaz.*, 1839, p. 713) recommends the following course, namely: to rupture the membranes at the commencement of the labor, in those women whose previous history would cause us to fear a profuse hemorrhage after the delivery; without waiting for the dilatation of the os uteri, or at least for the development of strong pains; he then applies a bandage around the abdomen, and gradually tightens it as the labor advances. The subsequent progress is abandoned to nature; taking care to keep the apartment cool, and forbidding the employment of stimulants of any kind. I have, he says, several times adopted this plan with success.

There are still some other prophylactic measures of great value, when there is reason to fear inertia of the womb. For instance, the best way of modifying the action of the determining causes, is to retard the termination of a rapid labor as much as possible, particularly in women of a lax fibre

and lymphatic temperament; but, on the other hand, to accelerate a long and painful one by aiding the inefficient powers of nature before the patient is wholly exhausted, and before the womb falls into a state of atony. Doctor Clarke very properly advises the hand to be placed over the fundus during the expulsion of the child, with a view of affording it support, both during and after the contraction. Burns adds, that moderate pressure on the abdomen after the delivery of the placenta proves beneficial in keeping up and stimulating the action of the organ.

"But," says Madame Lachapelle, "if, notwithstanding all your exertions, and notwithstanding the most perfect rest, and the express charge to the patient not to bear down, you find the accouchement progressing with a fearful rapidity, you still have one resource left, that is, to leave the placenta in the womb until fresh pains are excited. For, in most instances, this body is not entirely detached, and it resists the flooding so long as the stupor of the womb, caused by its too sudden evacuation, persists. In the opposite case, that is, when the labor has been too long, the placenta is ordinarily separated from the uterine wall, at least in a great measure; and hence it can no longer oppose the discharge of the blood. From that time its presence will only serve to keep up the feebleness of the uterus, and by irritating its walls, exhaust it without any benefit; you should therefore proceed at once to the delivery of the after-birth, free the womb from it entirely, and take advantage of the little energy remaining to the latter to procure its proper retraction." (*Pratique des Accouchements*, t. ii.)

The English accoucheurs have taken advantage of the sympathy which appears to exist between the mammæ and the uterus, in order to overcome the tendency of the womb to inertia in certain women. Relying upon the well-known fact that putting the child to the breast often excites after-pains within the few days immediately succeeding the delivery, they recommend this to be done as soon as possible after the child is born. So great is their confidence in this measure, that, according to Marshall Hall, no practitioner would be justified in leaving a woman who is predisposed to inertia of the uterus, without directing a proceeding which is at once so simple, and so sure to be effectual. Besides the sympathetic excitement of the womb thus produced, the suction would have the additional advantage of diverting the blood from the uterus by directing it toward the breasts.[1]

I cannot too strongly insist upon the administration of from 15 to 30 grains of ergot whenever there appears to be a tendency to inertia after delivery. It is always an innocent remedy, and one which, I am sure, has prevented many a flooding.

Curative Treatment. — There is one special indication presented after the child is born, namely, that of arousing the uterine contractions, which alone can put an end to the hemorrhage, as soon as possible. The means suggested

[1] Rigby advises, that whenever there is reason to fear hemorrhage from inertia after delivery, the child be put to the breast as soon as the mother is changed and put to bed. He assures us, that in several grave cases, in which all other means had failed, the uterus contracted strongly and permanently as soon as the child had seized the nipple. In one case only did the usual effect fail to take place, and this, Rigby thinks, was due to the fact of the child of another woman having been made use of.

for this purpose are exceedingly various, but we shall endeavor to estimate their respective values.

Of all the various measures recommended for the flooding dependent upon inertia of the womb, the easiest and most certain is a direct irritation made simultaneously over the body, and on the neck of this organ, by placing the hand on the lower front part of the abdomen so as to rub, press, and squeeze the uterine wall, whilst at the same time two fingers are passed into the vagina to irritate and titillate the os uteri. If these do not effect the object, the whole hand is to be carried up into the cavity of the organ.

Even supposing that the placenta has been expelled, the accumulation of coagula in the cavity of the uterus prevents the retraction of its muscular tissue, and the first thing to be done is to turn them out with the hand, which should be fearlessly introduced into the parts as often as may be required; then irritate and stimulate its internal surface with the fingers, the other hand keeping up the frictions on the hypogastrium in the meanwhile. The operator is sometimes obliged to compress and knead the organ, as it were, by bearing strongly on the abdominal surface, while the hand in the cavity serves as a point of support.

This measure is preferable to all others, because it can always be resorted to without alarming the patient, and is not likely to bring on an inflammation of the organ, as is the case with most of the astringent and stimulant articles advised by some writers. The injection of rectified alcohol, oil of turpentine, spirit of vitriol, &c., into the uterine cavity, recommended by Pasta to be used in such cases as a caustic, ought to be banished from practice. Even the employment of strong vinegar requires the exercise of much discretion.

Should the irritation made by the hands prove insufficient to arouse the contractility of the uterine tissue, we must resort to an application of cold, which acts both as a sedative to the circulatory system, and as an astringent on the muscular fibres. Compresses dipped in iced water are to be applied over the lower part of the abdomen, the genital organs, and the upper portion of the thighs; and a quantity of cold water might be injected into the vagina at the same time, taking care to pass the extremity of the canula into the uterine cavity. In a serious case, the example of M. Evrat might be advantageously followed; this gentleman carried a peeled lemon up into the womb, and then expressed its juice with his hand, so that the citric acid, by coming into contact with all parts of the internal surface, would stimulate the organic contractility. Or that of M. Desgranges, by introducing a sponge dipped in vinegar, then squeezing out the fluid, and abandoning it in the uterine cavity; having previously taken the precaution of passing a silk cord through it, by which it can easily be withdrawn when deemed advisable.

Again, some persons have suggested that a piece of ice be passed up and left for a few moments in contact with the uterine surface. But the employment of this measure, as well as the external application of cold, must not be persisted in too long; because, as Madame Lachapelle has judiciously remarked, the prolonged application of snow, ice, cold irrigations, douches, and sponging with very cold water, that has been so much vaunted by some

authors, is not unattended by danger to the patient; and, therefore, the use of cold ought to be restricted within moderate limits. Most generally it becomes ineffectual in the course of five or six minutes; often, indeed, it proves positively injurious, either by reducing the woman to a state of mortal torpor, or by exposing her to a violent inflammatory reaction.

There are some cases of obstinate hemorrhage, in which all the measures yet spoken of prove ineffectual. For such cases other remedies have been recommended, which now claim our attention. These are the tampon, the introduction of a bladder into the womb, the approximation of the uterine walls by immediate pressure, compression of the aorta, the use of ergot, of opium, and transfusion.

1. *The Tampon.*—Leroux reports quite a number of cases of inertia of the womb, in which the tampon arrested the flooding where it seemed to be inevitably fatal. But, as Desormeaux remarks, it often happens that men, even those who are otherwise worthy of credence, are often more successful with remedies of their own invention than any one else. In fact, the only effect of the tampon in many cases is to convert an external into an internal discharge. In order to obviate this disadvantage, it has been suggested to combine its employment with compression of the uterine walls, by means of the hands. M. Chevreul, who is favorable to its use after the delivery, adds that it is necessary to irritate the organ externally as much as possible. But in the cases mentioned, both by him and Leroux, where the tampon was apparently successful, it was not, as M. Baudelocque avers, so much in preventing the discharge of blood, and determining its coagulation, as by irritating the internal surface of the womb, and thereby producing a retraction of its vessels, that the plug could have had a salutary effect. The tampon itself, or rather the irritating substances M. Chevreul saturates it with, conjoined with external stimulation, may indeed bring on the contraction in many cases; but the mere plugging up of the vagina, as directed by Leroux, is useless, to say the least; and therefore the introduction of some old linen, steeped in vinegar, into the uterine cavity, is in reality the only efficacious part of the plan; but even this will prove still more beneficial when accompanied by compression of the hypogastrium, and by frictions and stimulations of the organ above the pubis.

2. The introduction into the womb of a hog's bladder, which has been softened by holding it a short time in warm water, is even a worse measure than the preceding; and it is really astonishing that Gardien seems to be in favor of its employment. The presence of a bladder would evidently be a continual obstacle to the retraction of the womb. Great stress has been laid upon the compression, which it might make on the vascular orifices, but to no purpose: for, even were this a constant result, which however is far from being the case, since we are never sure of filling the uterine cavity precisely, the difficulty would only be delayed, as the hemorrhage might reappear as soon as the bladder is withdrawn; and then, after all, we should have to fall back on the contraction of the organ.

3. M. Deneux conceived the happy idea of pressing the uterine walls together, in a desperate case, by means of a folded napkin, which he applied over the hypogastrium, and retained in position by a tight body-

bandage; this arrested the discharge of the blood completely. Notwithstanding M. Baudelocque has accorded the original suggestion of this plan to M. Deneux, it was long since recommended by the English writers. This procedure has been unjustly censured by certain practitioners. Breisky's method of bimanual compression of the uterus is to grasp the fundus through the abdominal walls, compress it firmly and push it downward and forward against the pubic bone, while the index and middle fingers of the other hand in the posterior *cul-de-sac* of the vagina presses the cervix forward toward the body of the uterus.

4. Quite recently, M. D'Ornellas defended a thesis on the compression of the aorta as a remedy in uterine discharges, and he brings forward numerous cases in support of his theory. M. Baudelocque has assured me that he has several times succeeded in arresting a flooding in this way, which threatened an early fatal termination. This gentleman, who disputes with Dr. Trehan the honor of its revival, appears to have great confidence in the efficacy of the measure; and we may add, that a very great number of facts now militate in favor of his opinion. He recommends the compression to be made in the following manner: first, flex the patient's superior and inferior parts on the pelvis; then depress the abdominal wall immediately above the fundus of the womb with the four fingers of one hand, when the pulsations of the aorta will be more distinctly felt than the beating of the radial artery. The compression may be kept up for a considerable time without causing any particular inconvenience to the woman; M. Baudelocque states that he has persisted in it for more than four hours. This compression, however, is only considered, even by its author himself, as a mode of gaining time; for he administers ergot almost immediately, by the action of which the uterine contraction is soon established. Compression of the aorta, though long since recommended, had been generally proscribed because the modes of effecting it were very imperfect. Thus, some directed the pressure to be made through the ventral surface and the double uterine wall; while others introduced the hand into the cavity of the uterus, and then subjected the vessel to pressure through the posterior wall of this organ. But both of these modes ought to be rejected, because they impede the retraction of the womb.

Notwithstanding the numerous successes which have been attributed to this operation, several authors, amongst whom M. Jacquemier is conspicuous, contest its utility, and even go so far as to consider it injurious. "In the profuse floodings following delivery, the blood which escapes," says M. Jacquemier, "proceeds in great part from the veins, and compression of the aorta could only favor the reflux of venous blood into the vena cava and the branches which empty into it." It is not to be supposed that the utero-placental arteries could furnish the enormous amount of blood that sometimes escapes in a few moments from a recently delivered woman, and there can be no doubt that a great part of it is discharged from the large, gaping venous orifices left upon the internal surface of the uterus by the detachment of the placenta. Though agreeing with M. Jacquemier as regards this point, I cannot unite with the conclusion which he draws from it. Such, in fact, are the relations between the aorta and vena cava, that

it is almost impossible, unless it be done expressly, to compress one without compressing the other. I am very willing to admit that a mistake may have been made in respect to the nature of the service thus rendered, and that all the credit hitherto accorded to compression of the aorta should be transferred to the flattening of the vena cava; but of what importance is this as regards the practical result, since the arrest of the hemorrhage is no less the consequence? M. Jacquemier has done a real service in pointing out a theoretical error, but I would almost blame him for it, should he thereby deprive the practitioner of an invaluable resource. I therefore accept his theory, but shall nevertheless continue to compress the aorta, although convinced that I shall compress the vena cava at the same time.

Still another objection has been made to the proceeding. Although compression of the aorta, it is said, may prevent the blood from arriving by the uterine arteries, it must necessarily increase the amount that passes through the ovarian arteries, inasmuch as it is generally performed below the origin of the latter. . . . The objection loses much of its value from the fact that the hemorrhage is chiefly venous. But of four arteries supplying blood, two only are permeable after compression of the aorta; so far, therefore, it is a marked advantage.

M. Jacquemier also regards the administration of ergot during the compression as useless and irrational. "How shall we admit," says he, "that this agent, whose effects are so prompt though evanescent, can stimulate the uterus, *since the arterial blood is cut off from it?*" It is by first acting upon the nervous centres and stimulating the excito-motor properties of the uterine nerves, that the drug exerts its special action on the uterus; therefore, to suppose that after having been absorbed by the stomach the medicament can only act by being carried by the circulation into contact with the uterine fibre, involves, I think, a physiological error.

Hitherto, compression of the aorta has been recommended only for the purpose of suspending the discharge of blood, and giving the measures for restoring the uterine contractility time to act. I think that it is capable of rendering great service even after the discharge is suspended and the womb contracted. The fact is, that when flooding has been profuse, all danger is not at an end from the moment that we have succeeded in arresting the hemorrhage and bringing about the contraction of the uterus; for although not a single drop of blood should be discharged afterward, the amount of this fluid remaining in the body is no longer sufficient to supply all the organs, and the brain at the same time, with the stimulus necessary to the maintenance of the integrity of their functions; so that women sometimes expire two or three hours after the arrest of the hemorrhage. Death then takes place, because the remaining blood, being equally diffused throughout the entire extent of the circulatory apparatus, the brain, and especially the spinal marrow, receive too small a proportion of it, and consequently are not sufficiently stimulated to enable them to support the respiration and the movements of the heart. This being admitted, it is easy to understand that if, by compressing the abdominal aorta, we can prevent the blood discharged by the left ventricle from descending into the lower parts of the body and inferior extremities, it will necessarily be obliged to flow back toward the

brain in greater quantity, and thus secure for this organ the degree of stimulus which it requires to enable it to react in its turn upon the functions of the heart and lungs.

The compression of the aorta may be assisted powerfully by placing the woman on an inclined plane, so that the head shall be the lowest part of the body.

I think, therefore, that compression of the aorta and vena cava is useful whilst the flooding continues to be profuse; but also, that when the patient has lost a great amount of blood, it should be continued for several hours after the arrest of the hemorrhage and thorough contraction of the walls of the uterus. In the latter case however, it is important to separate the aorta from the vena cava, so that the compression may act on the former vessel exclusively.[1]

5. *Ergot.*—In an alarming hemorrhage, one dependent on a complete inertia of the womb, for example, the patient would certainly die unless the means at hand act promptly. In such cases the hypodermic injections of ergot or ergotin are most important. The formula of Eulenburg may be employed:

℞. Ergotini, gr. ij.
Spir. Vini rect.
Glycerini puri, aa. ʒss. M.

Five minims of this contain $\frac{1}{6}$ of a grain.

The aqueous extract of ergot (extractum ergotæ, U. S.) is especially adapted for hypodermic injection. The fluid extract (U. S. P.), carefully filtered, may be used in the dose of 10 minims. (See *Therapeutics*, article ERGOT.)

In some females, the uterine hemorrhages have a marked tendency to relapse. Consequently, ergot ought to be administered as soon as it has occurred, whether it seems to be finally arrested or not. For, in the former case, it can do no harm, and, in the latter, it will prevent a return of even a partial inertia; which is not an indifferent matter to a woman who is already exhausted from the previous loss, and who is liable to succumb under a fresh discharge, however inconsiderable it may be.

6. The English authors (Burns and others) recommend the use of *opium* in full doses, both as a preventive and a curative remedy in cases of flooding from inertia. I cannot understand how opium alone can have any influence whatever over the contraction of the uterus, which is here the only hope of safety.

7. Many other remedies have been employed, such as water at 110° F. injected into the uterine cavity; electricity applied directly to the uterus; the injection of the perchloride of iron, or the tincture of iodine.

[1] Compression of the aorta was once resorted to by M. Roux in the case of a wounded patient, who was exhausted by frequent hemorrhages. I think, however, that I was, myself, the first to suggest and perform it, in the floodings of newly-delivered females. In the month of March, 1845, after stating the physiological principles upon which I based my conclusions, I proposed the operation in a formal manner, in a communication to the Medical Society of the department of the Seine. I am the more particular in stating this fact, as the same suggestion has been made in other quarters without acknowledging my priority.

The danger from injection of strong styptics into the uterus has been considered as sufficient to deter us from their employment except in the most urgent cases.

8. *Transfusion*, which has been so highly praised by certain English writers, in whose hands it seems to have succeeded quite a number of times, has not been followed by the same success in France. It is one of those extreme measures which might be employed in desperate cases, though it cannot be relied upon; because the extent of the flooding, the extreme debility of the patient, and the slowness of its operation, generally render it ineffectual; without referring to the nervous and inflammatory symptoms, and the phlebitis, which very frequently succeed the operation. Besides, it evidently could only be practised with any chance of success after the flooding had ceased, and the uterus was thoroughly contracted, and then I think that compression of the aorta would have almost all its advantages without any of its numerous dangers. I once saw it performed at the *Hôtel-Dieu* without any benefit whatever. In some of the reported cases, a notable improvement was effected by a moderate quantity of blood (three or four ounces); in others, it was necessary to inject as much as ten, and even as high as thirteen, ounces.

In M. Nelaton's case, he injected first six, and five minutes afterwards eight, ounces of blood. The operation was conducted as follows: The median basilic vein was uncovered by an incision three-quarters of an inch in length, then isolated, and raised by a loop of thread so as to flatten it and stop the circulation in order to prevent any loss of blood. The anterior wall of the vein was next seized with a pair of forceps, and half divided obliquely from below upward, so as to form a V-shaped flap, which might be raised or restored at pleasure. The blood drawn from one of the resident surgeons was received in a dish warmed to the temperature of 77° F., and poured immediately into a syringe heated to the same degree.

Everything being thus prepared, whatever air remained in the syringe was expelled, the little V-shaped flap was raised with the forceps, the tube of the instrument introduced into the vein beneath it, and the injection performed slowly. The second injection was made five minutes afterward, and the wound in the arm closed by means of collodion.

9. We have hitherto supposed the hemorrhage to come on after the removal of the placenta; but inertia of the womb, and the consequent hemorrhage, often occurs before this, so that retention of the placenta, under these circumstances, is attended with some special indications which it is important to specify. Whenever a hemorrhage takes place, a more or less considerable portion of the placenta must evidently be detached: sometimes, even, it is wholly separated from the uterine wall, being left free and movable in the cavity of the organ. The directions given by authors in this case are very variable: thus, some advise us to extract the secundines at once, together with any coagula the uterine cavity may contain; others, on the contrary, to try first to remedy the inertia, which is the sole cause of the accident. We do not hesitate to recommend the latter advice when the hemorrhage is slight, because, if the placenta is partially removed, we would certainly augment its sources by completing the separation. Hence we look

upon it as good practice not to attempt the extraction, and more particularly the detachment of the placenta, until the accoucheur, by stimulating and irritating the organ with his hand, has secured its diminution and contraction to such an extent that it drives, as it were, the coagula and after-birth beyond his hand.

Should the adhesions of the placenta be unusually firm, the injections into the umbilical vein, spoken of in the last chapter, might be resorted to.

But when the hemorrhage is profuse, and the placenta is completely detached, or adheres to the uterus by only a very small portion of its surface, it should be extracted together with the clots which may have collected within the cavity of the uterus. Their presence there prevents an energetic action upon the walls of the womb, and may impede their contraction. Therefore, the best means of arresting the flow of blood is to empty the uterus of its contents as quickly as possible.

When the physician has been fortunate enough to overcome the hemorrhage by a resort to the various measures just alluded to, he should still continue with his patient for several hours, carefully watching the character and amount of the discharge from the vulva, and occasionally placing a hand over the hypogastrium, so as to detect any increase of volume in the uterine globe. Should the uterus become relaxed and grow larger, we may be certain that it is again filled with coagula, and the hand should be again introduced without hesitation, notwithstanding the patient's entreaties, and the contents turned out; at the same time stimulating the organ by friction upon its internal surface. The operation should be repeated until the discharge is finally arrested. He ought also to take the precaution of applying cloths steeped in vinegar or alcohol, or even in cold water, over the belly, and to retain them there by a moderately drawn body-bandage. Absolute quiet is to be insisted on. As nourishment, the patient might have some light cordial, broth, sweetened wine, &c., &c.

Usually, the patient is put to bed an hour after her delivery; but after severe floodings, she should be carefully protected from any sudden motion and it is often necessary to let her remain in the same position for eight, ten, or twelve hours. The least movement might cause a mortal syncope.

After a profuse hemorrhage, the patient is naturally inclined to sleep; some persons think it better to prevent her from slumbering, lest the discharge be renewed without her knowledge. But as this repose repairs the exhausted forces, it ought not to be hindered; but she must never be left; for the pulse, the uterus, and the vaginal discharge require a constant oversight.

The patients are frequently tormented, after considerable floodings, by vomiting, or at least by sick stomach, nausea, and retchings. Independently of the pain they occasion, these gastric symptoms are not wholly devoid of danger; for the vomiting, from the fatigue caused by the strainings to which the woman gives way, may produce a syncope, during which the hemorrhagic discharge may be renewed profusely. If there are only the nausea and inclination to vomit, the women are often so tormented thereby as to wear out the little strength they have left; and this exhaustion of muscular power, at a time when the uterine contraction is so necessary, is a very

melancholy condition. "Nothing tranquillizes the stomach under these circumstances," says Dewees, "so far as I have observed, like opium, in the solid form. A newly prepared pill of two grains of opium, with a very small portion of soap, to facilitate its solution in the stomach, should be given every hour or two, until the vomiting ceases, or the stomach becomes reconciled. I have found a sinapism over the region of the stomach of great service, and it should be resorted to if necessary."

The opiates, in a fluid form, might also be used with advantage. When after a profuse flooding the patients are excited, uneasy, or tormented by a feeling of extreme discomfort, a few dessertspoonfuls of the syrup of diacodion will generally serve to calm their anxiety, and procure the refreshing sleep which they so greatly need.

[The danger is not over with the cessation of a profuse hemorrhage, for alarming attacks of syncope are of frequent occurrence. Under these circumstances the English practice ought to be followed, which consists in the use of alcoholic drinks, such as brandy, rum, Madeira wine, &c. They may be either diluted or given pure, and a large amount can be taken without producing the least symptom of intoxication. A woman may thus drink from three to sixteen ounces of brandy in less than two hours, without the slightest inconvenience. Brandy and water, with a little lemon-juice, is often a very good preparation, because the pleasant taste renders it agreeable to the stomach.

Nothing restores more rapidly the exhausted strength of a woman enfeebled by sudden hemorrhage, than alcoholic drinks and cold broths; unfortunately, however, the stomach often rejects whatever is taken into it. To quiet this vomiting, fragments of ice, always taken with avidity, may be administered. Should the vomiting prove intractable, absorption by the large intestine, through the use of enemata, may be attempted, and an injection given of broth and wine, with the addition of from 15 to 20 drops of laudanum. Dr. Charrier, former clinical chief at the hospital of the Faculté, published several cases which seem to prove the utility of these injections, and I can myself bear witness to their efficacy. Therefore, in serious cases, they should not be overlooked.]

As the patient begins to recover from the extreme weakness which immediately follows a profuse loss of blood, symptoms of febrile reaction begin to appear: the pulse is small and rapid, sometimes hard, and sometimes compressible; the heat and dryness of skin are increased, the tongue is dry, and the features contracted: the patient is very thirsty, and feels disgust for solid food: she is startled by the least sound, or by a bright light: she complains of violent headache, and sometimes of palpitations and dyspnœa. She is unable to sleep, or, if she dozes, is liable to be awakened by violent startings.

This condition evidently results from the excitement of the nervous system occasioned by the loss of blood, an excitement which we should endeavor to calm from the outset.

Evidently, the first indication is to repair the losses of the organism by food which shall be easily digested, and frequently administered in small quantities at a time. Broths or light soups are eminently suitable.

The best means of calming the excitability of the nervous system are perfect rest, cold aspersions upon the hands and face, but especially opiates given frequently and in small doses.

§ 2. Secondary Hemorrhage.

In order to complete the history of puerperal hemorrhages, we have yet to speak of some accidents which occur at a variable period after delivery, and which o ı that account have been styled *secondary hemorrhages.*

These floodings, which are so profuse as seriously to endanger the health and sometimes even the life of the patient, have been treated of very imperfectly in the most recent treatises, and we ourselves committed the mistake of passing it over with a very slight notice in the earlier editions of this work. Dr. Clintock has recently performed a valuable service in calling attention to the various circumstances which may give rise to them. Sometimes these causes begin to act very shortly after the delivery of the placenta, and the thorough contraction of the uterus, sometimes not until after two or three days, and occasionally even after three, five, or six weeks. But at whatever time their influence is manifested, their mode of action is nearly always the same as at the other periods of the puerperal state; and the hemorrhage may then be accounted for either by secondary inertia, by a too active congestion, a real *molimen hæmorrhagicum*, or, finally, by an alteration of the blood, consisting in a great increase of its fluidity.

The hemorrhage, or rather the inertia which produced it, is not confined to the period of delivery, or to that which immediately succeeds it; so that as regards the time of its appearance, we may distinguish a primitive inertia, which is that just described, and a secondary, to which attention has been especially called by Ramsbotham, and of which we have ourselves observed several examples.

A. *Secondary Inertia.*—Some moments, hours, and sometimes even several days after delivery,[1] the uterus, which had contracted properly and had remained so during all that time, may suddenly become relaxed. Its walls become softer, and it increases in size. At the same time the patient grows weak and pale, the pulse loses its strength and quickens, and if the genital parts be carefully examined, it is found that very little blood is discharged, and that the clothes are but slightly soiled. But if the uterine tumor be compressed slightly, or the organ be incited to contraction by friction upon the hypogastrium, a considerable amount of coagulated blood is suddenly discharged by the vagina. After this evacuation the size of the uterus is diminished, it is harder, and remains so, so long as the hand continues to press upon it; but if the pressure be removed, the softened walls are soon found to become distended afresh, and then contract again, driving out another quantity of clots, provided the accoucheur renews the pressure and frictions calculated to excite their contractility. This series of occurrences may take place several times, if the accoucheur relinquishes too soon the

[1] Mr. Fergusson reports (*New York Medical Journal*, Sept., 1850) a case of grave hemorrhage occurring thirteen days after delivery. The cause was secondary inertia. The author examined statistics in reference to this subject, with the following result: out of 16,654 labors observed by Collins in the Dublin Hospital, there were 43 cases of hemorrhage immediately after delivery, and 40 twelve hours afterward. The flooding, in one case, occurred only on the fourth, in another on the sixth, and in still another on the tenth day.

Drs. Clintock and Hardy observed one on the seventh day, and Dr. Stimever another on the tenth.

use of the proper means for making the uterus contract permanently; and if the cause of the hemorrhage should not be discovered, it might cost the woman her life.

Now several circumstances are liable to lead into error. In the first place, the physician had previously ascertained the condition of the womb, and it does not immediately strike him that it may have become relaxed in a secondary manner, after having remained so long properly contracted. Again, it frequently happens that the patient, exhausted by the fatigues of the labor, falls asleep, and does not herself perceive her extreme weakness, until her condition has become irremediable.

Nothing but an examination of the uterus is capable of clearing up the diagnosis. This organ is then found to be much larger than it was after the labor, and the finger carried up to the internal orifice, finds it blocked up by a clot of considerable size.

The accoucheur should use every effort to procure the contraction of the walls of the uterus, and especially to render it permanent. The best way of accomplishing this is, to continue the pressure himself which was made at the outset by the hand on the fundus of the womb, and afterwards substitute for it permanent compression. For this purpose, several napkins folded on each other are placed on the fundus of the womb, and by means of a body-bandage tightly applied, the organ is held strongly pressed against the opening of the superior strait. I am in the habit of administering immediately fifteen grains of ergot, and of repeating it every half hour or hour, according to the degree of tendency to relaxation, in doses of from six to eight grains.

B. *Congestions of the Uterus.*—Under this title, Madame Lachapelle has described a flooding, which comes on some time subsequent to the parturition; and which is produced, as she supposes, under the influence of a peculiar *molimen hæmorrhagicum*. This variety is occasionally developed even without any inertia of the womb. "We have known," she continues, "a woman to perish seven or eight days after her confinement, from a profuse discharge of serous blood, which transuded from all parts of the utero-vaginal surface, and saturated, by imbibition, the most solid tampon: the womb was soft, but not distended with the blood." I have twice known hemorrhage to take place after the delivery of the after-birth, says M. Velpeau, although the womb had been contracted in the one case for four and in the other for seven hours. He further states that this accident is occasionally manifested subsequent to the first twenty-four hours.

These congestions, which in certain rare cases are inexplicable, may usually be attributed to certain easily detected, general, or local causes.

We have already spoken (page 877) of the liability of the retention of a portion of the placenta to give rise to these hemorrhages, and we would now simply add that the presence of a large clot within the womb might have the same effect. Both Collins and Madame Lachapelle report cases of flooding coming on eight and ten days after delivery, and which ceased only upon the artificial extraction of the coagula.

The determination of blood may also be occasioned by the retention of a portion of the membranes, as in the following case.

I was sent for by a physician to see a lady living in Rue Gros-Caillou. On arriving there, I found M. P. Dubois, who was called at the same time, but who preceded me, engaged in extracting a considerable portion of the membranes, which had been imprudently left behind whilst delivering the placenta. The child was born at nine P. M., and half an hour afterwards hemorrhage came on, which could not be arrested until half-past one in the morning, at which time the foreign body was extracted. The uterus had remained perfectly contracted throughout. (See also page 879.)

The extraction of the foreign body, in the latter case, generally dissipates the symptoms; in the former, a resort to revulsives to the upper part of the body, to cold applications, and even to venesection, is evidently indicated. These will be materially aided by a regulated diet, and absolute rest in the horizontal position.

Intra-uterine polypi have several times given rise to mortal hemorrhage two or three weeks after delivery. It has been thought that these bodies occasion the flooding only by preventing the contraction of the uterus. We are disposed to reject this opinion, because, as Oldham observes, in these cases the strongly contracted uterus can readily be felt above the pubis. Besides, the cessation of the flooding after ligation of the polypus without excision, justifies the belief that the latter does not act simply as a foreign body; for were it so, the discharge would continue after the ligature was applied.

Irritation of the neighboring organs may give rise to hemorrhagic congestion of the uterus. M. Moreau mentions a case of hemorrhage which occurred on the eighth day after delivery, and which he very properly attributed to a collection of hardened fæces in the large intestine. Injections were used without advantage, and he was obliged to empty the rectum by using a sort of scoop. As soon as this was accomplished, the discharge ceased.

For a long time after delivery the uterus continues to be a centre of fluxion, toward which the general disorders of the economy seem to converge. There appears to be no other way of explaining such floodings as are apparently due to violent moral emotions, the abuse of stimulants, &c.

c. *Alteration of the Blood.*—M. Blot also mentions, in his excellent thesis, the case of a woman whose uterus was firmly contracted, and who died in consequence of a sero-sanguineous discharge succeeding flooding after delivery. This hemorrhage, which nothing was capable of arresting, is attributed by M. Blot to albuminuria and the consequent impoverishment of the blood. I have already had occasion to remark, that new observations are necessary to prove the correctness of this assertion.

I cannot, however, agree with Madame Lachapelle, who thinks that these floodings are produced by an accidental congestion, a sort of *molimem hæmorrhagicum*. I think, on the contrary, that they are the result of a serous condition of the blood, preventing the formation of obliterating coagula, and allowing the fluid to exude from the internal surface of the uterus. This sometimes takes place from the surface of wounds in certain patients affected with anæmia, scurvy, &c. But to admit with M. Blot that it is caused by albuminuria, would be going rather too far.

The use of the tampon, assisted by compression of the uterus by means of a bandage drawn tightly around the abdomen, would be proper under these circumstances. Ergot has often been used, without any advantage whatever, in these dangerous cases. Some English physicians approve highly of styptics taken internally.

D. *Inflammatory Ulceration of the Cervix.*—Bennet, of London, was the first to ascribe inflammatory ulceration of the cervix as a cause of secondary hemorrhage, and his observation has been confirmed by others. Fordyce Barker says: "I am certain this condition exists more frequently in puerperal women than most physicians, even at the present day, seem to believe. I am sure that I have sometimes met with sudden actual hemorrhage due to this cause alone." The most common effects, according to the observation of Byford, is retardation of the process of involution, the lochia continuing for weeks and even months.

If in such cases secondary hemorrhage does not occur, the results are the same, and it will be found that treatment of the ulceration will often arrest the drain upon the system.

§ 3. Hemorrhage from the Umbilical Cord.

In twin pregnancies, hemorrhage may take place from the cut placental extremity of the cord, after the first child is born. For although no vascular communication habitually exists between the two placentas, yet the contrary has been too often observed to leave any doubt with regard to the fact at the present day; and hence it is admitted by most practitioners. Besides, we find cases recorded by Méry, Baudelocque, and Solayres, which fully prove that, even in single pregnancies, a hemorrhage profuse enough to endanger the mother's life may occur after the division of the cord, as also that the umbilical vein is the sole source of this discharge. "As regards the bleeding from the placental end of the cord, other than in cases of twins, I can aver," says M. Chevreul, "having observed it three times in women whom I had delivered with the forceps; having cut the cord in a hurry without applying any ligature, the blood continued to flow abundantly from that portion connected with the placenta, whilst I was devoting the necessary attentions to the child. I resorted to all the modes of irritation advised in such cases, for the purpose of rousing the contractions; but the discharge was only arrested by tying the cord. The delivery of the afterbirth shortly occurred, and was followed by no untoward accident." Quite recently, M. Guillemot has met with a very similar case. Dr. Albert, of Wiesentheid, saw the blood spring from the extremity of the cord, in a stream as thick as a straw. The hemorrhage, which was considerable, could not be arrested except by pressure upon the umbilical vessels; and a ligature had to be applied.

By reflecting on the mode of vascular connection heretofore studied in the placenta, it really seems impossible to understand how the mother's blood, in a natural condition of things, can pass into the ramifications of the umbilical vein, and thence escape in such profusion. Under such circumstances, ligature of the cord is evidently the only resource.

§ 4. Inversion of the Womb.

This is an affection in which the fundus of the organ, being indented or depressed, is more or less inverted into its cavity, or even passed down through the os uteri into the vagina, or out at the vulva.

Inversion of the womb exhibits many different degrees; from a simple depression of the fundus to complete inversion, in which case the organ is turned inside out, the internal or mucous surface becoming the external one, and *vice versa*. For the purposes of description, we shall admit three principal degrees: in the first of which the fundus is simply depressed, approaching to, but not engaging in, the os uteri; the second is a partial inversion, in which the fundus actually engages in the orifice, and protrudes into the vagina; and the third is a complete inversion, in which the uterus is turned inside out, appearing at the vulva, or even protruding beyond it.

1. When the depression commences at the fundus, a concavity is produced in the tumor above the pubis, having its highest borders nearer to the latter than to the sacrum; or it may commence at the sides; and when it is the front one that is indented, the posterior border is higher than the anterior, but when the reverse happens, the posterior is the lower: again, when it is depressed laterally, the concavity in the top of the womb is inclined towards one of the iliac fossæ. If the placenta is still undetached, the indentation is augmented by pulling on the umbilical cord. Finally, when the finger is passed into the cavity of the womb, it finds the fundus within half an inch, more or less, of the orifice.

2. When the inversion is partial, we can detect a hemispherical tumor by vaginal examination, varying in its size, according to whether the placenta is detached or still adherent; the neck of the womb encircles this tumor at its upper part like a collar. The ball usually formed in the hypogastric region by the uterine globe, is no longer felt on palpation; a considerable depression being found in its place.

3. Where it is complete, the tumor may either fill up the vagina without passing beyond the vulva, or may hang down between the woman's thighs. In the former case, the whole vaginal cavity is occupied by a voluminous tumor, the upper part of which can scarcely be reached; in the latter, which is the most serious of all, the pelvic cavity is altogether empty, and nothing can be felt there by the hand; but a large tumor is found between the patient's thighs, having the placenta attached, wholly or in part. The top of this tumor is either simply concealed between the labia, or extends up into the vagina. In some instances, the latter has also been implicated in the displacement, and has been inverted in a great measure, thereby giving a considerable length to the tumor. "We cannot, however, say that the inversion is strictly complete," says Burns, "for, in most cases, the lips of the os uteri hang down, and the inversion terminates at the lower part of the cervix." Some writers assert, notwithstanding, that the lips may be completely inverted.

This accident is always accompanied by general phenomena, which are the more serious as it is the more considerable. The patient not only suffers from pain, but she is harassed by a constant desire to urinate, and by strainings at the close-stool, which are often sufficient to render an inversion

complete, that would otherwise have only been partial. The pain becomes excruciating, and the frightened sufferer falls into a state of syncope; the pulse is feeble, and sometimes is nearly or quite imperceptible. The intensity of these general phenomena varies with the state of retraction or relaxation of the cervix, and with the degree of inversion. For instance, it is much less in a simple depression, than where the inversion is more complete. Furthermore, the pains and dangers are much greater in the latter case, if the cervix uteri is firmly contracted, than when it is dilatable. Again, should the placenta be partially detached at the time of the accident, there will be a profuse hemorrhage; but, on the contrary, when it is firmly adherent throughout, no discharge occurs, since the latter only begins with the separation of the after-birth, and increases as this progresses. Lastly, when the inversion is complicated by inertia, which unfortunately is usually the case, the flooding is frightful, and can only be moderated by the contraction of the womb.

Inversion is sometimes produced by attempting to effect the delivery of the after-birth before it is entirely separated, by pulling imprudently on the cord. It may also result from a very rapid labor, more particularly if the woman happens to be standing at the time when the child is born; for if the umbilical cord is unusually short, or is wound around some part of the child, the fundus may be pulled down by the strain on the cord, and thus become inverted.

Inversion from this latter cause is far more unusual than one would suppose; because the cord is generally broken under such circumstances, incomprehensible as the fact may seem, when we reflect on the amount of force required to rupture it. The rarity of the inversion, however, is more readily explained by the powerful contraction at the instant the fœtus is expelled, and by the difference in the line of axis of the two straits; the axis of the superior strait forming nearly a right angle with that of the inferior one, or rather with that of the vulva. In other words, the cord passes around the posterior part of the symphysis pubis, as over a pulley; and, therefore, the greater amount of the tractive force is spent on the symphysis before reaching the fundus.

It may happen, from the uterus being in a momentary state of inertia after delivery, that the pressure made by the intestinal mass indents its fundus like the bottom of a bottle. Again, in cases of complete inertia, should the placenta be attached directly to the fundus of the organ, its weight alone might pull it down. Such accidents are usually corrected by the force of the contractions; though, should the operator pull on the cord before noticing the depression, he might increase the difficulty by converting it into a partial inversion.[1]

[1] Although I am only treating of uterine inversion here, as a complication of the delivery, I cannot refrain from mentioning a very curious case, narrated by Aug. at the *Société de Médecine*, of a woman who had a complete inversion of the womb twelve days after the confinement, and which resulted in consequence of severe straining at stool. This case, which was confirmed by Baudelocque, who was called as consultation, can leave no doubt as to the possibility of such an accident, however extraordinary it may appear. A still more wonderful case is related by Mr. Ebenezer Skae, as occurring in a woman who suffered complete inversion of the womb two days after

Dr. Tyler Smith supposes that inversion of the uterus is always occasioned by irregular contractions of the organ; even in the cases generally attributed to premature tractions on the cord, he considers, that the pulling does not act mechanically, but only by producing an excitement of the fundus of the uterus, where the placenta is inserted, which occasions an irregular contraction, and consequently a simple depression. This first degree of inversion, according to him, is immediately followed by a sudden contraction of the fibres above the depressed point, which tend by their action to expel the latter through the cervix, in absolutely the same manner as they would act upon a foreign body.

Dr. Smith's explanation of the mechanism of inversion may be true for some cases; but when the walls of the uterus are in a state of complete relaxation, it is difficult to allow that violent pulling upon the cord of an adherent placenta should be incapable of producing inversion.

When a simple depression occurs immediately after labor, it will scarcely attract attention, unless the placenta happens to be detached, and a hemorrhage is thereby developed. It ought to be reduced, as soon as detected, by placing the patient on her back, and having the abdomen and breech raised higher than the chest; the legs and thighs are flexed and held apart, and the head inclined forwards on the breast; then the operator carries his hand into the uterine cavity, and gently pushes out the fundus with his fingers.

M. Chevreul sums up so well the indications presented by the partial and complete inversions of the womb, with reference to the delivery of the afterbirth, that I cannot do better than transcribe here his remarks on this subject. He says: "A partial inversion is easily reduced when detected shortly after its occurrence. Of course, the placenta may either be separated wholly or in part, or it may be still adherent throughout to the womb, at the time of the accident. If wholly detached, the hemorrhage is very profuse, and requires immediate attention. The accident is remedied by placing the woman in a suitable position, and then, introducing the whole hand into the vagina, the fingers take hold of the inverted portion of the womb and endeavor to return it, by first pushing up the part that came down last. Should the placenta be partially detached, and the remaining adhesions be feeble, its separation ought to be entirely completed, by passing the fingers between it and the uterine wall; after which, the reduction is to be effected

aborting in the fourth month of gestation. (*The Northern Journal of Medicine.*) I will further add, that the observations of Sabatier would seem to prove that such an inversion may not only take place when the fundus of the womb is depressed by a polypus, but also in a state of perfect vacuity. The responsibility of the assertion must rest with the author.

M. Roussel communicated a case to M. Martin, in which the inversion did not take place until nine hours after delivery. The patient had a frightful flooding at the time of the extraction of the placenta, which M. Roussel arrested by the ordinary measures; after which, he remained with her until fully satisfied of the contraction of the womb. It was then about eight o'clock in the evening. At five the next morning, he was summoned in great haste; when it appeared that the patient had got up to evacuate her bowels, and the womb immediately fell down to the vulva. On his arrival she was senseless, and the pulse imperceptible; the finger, passed into the vagina, found there a large tumor, formed by the inverted fundus, around which the os uteri had firmly contracted, and doubtless had thus contributed to the diminution of the hemorrhage.

as in the former case. But if it is still adherent throughout, the whole is to be returned together; and then we may either wait for the spontaneous delivery of the after-birth, or we may attempt to separate it by the hand, according to circumstances."

Where the inversion has existed for several hours, it occasionally happens that the protruding portion of the womb is strangulated, as it were, by the os uteri, which constitutes a serious obstacle to its reduction. Under such circumstances, it is not advisable to use forcible attempts to surmount the difficulty, lest some serious accident might result; but rather to have recourse to venesection, to tepid bathing, to fomentations, to the use of the ointment or the extract of belladonna, and opiates; in a word, to all the means likely to relieve the constriction of the os uteri, and to moderate the force of the inflammatory symptoms. The inhalation of chloroform, which has been used with such fortunate results in analogous cases by MM. Barrier, Valentin, Charles West, and G. Gonney, might here also be of very great service. But if still unsuccessful, the patient will have to endure this disgusting infirmity for the remainder of her days.[1]

Where the inversion is complete, and the placenta is detached, we must first apply a soft and dry napkin upon the tumor, and then, having brought the fingers together in the form of a cone, depress its central part with their points, so as to make the fundus and body of this viscus gradually pass up through its orifice, and thus regain its primitive position. Should the conjoined fingers prove too bulky, the stick proposed by M. Depaul might be substituted for them with advantage. When the womb is once reduced, the napkin should be withdrawn. Should the placenta be partially detached, its separation is first completed, and then the operation is terminated in the same way.

Again, if the adhesions are very extensive, or if they exist throughout, we ought to attempt the reduction of all together, by proceeding as in the first case, excepting the use of the napkin; but if the orifice is not dilated enough to permit the womb to pass through with the placenta, it would be necessary to separate the latter, and then reduce the former as promptly as possible.

Whatever be the degree of inversion, the hand is always to be kept in the womb for some time after the reduction, for the purpose of preventing a return of the accident, and for soliciting the contraction of the organ. The inertia, if present, must be remedied by the appropriate measures.

It is found by experience that whenever inversion has occurred in a former labor, it has a tendency to be renewed at the subsequent ones. Consequently, no tractions on the umbilical cord, with a view of extracting the

[1] However, two cases are reported, the one by M. Delabarre (*Rec. de Mém.*), and the other by Baudelocque, which fully prove that spontaneous reduction of the womb may take place, even after it has been completely inverted for a long time.

M. Dubles endeavors to explain this natural reduction, in his excellent thesis, by the tonicity of the Fallopian tubes, and of the round and broad ligaments; which, after having been drawn down at the moment of the accident, will necessarily return to their proper position in the course of time, and thus, by acting on the organ that involved them in its descent, will gradually elevate and return it to its original position.

placenta, should ever be resorted to in women who have previously suffered from this accident. In cases of this kind, many practitioners prefer the introduction of the hand into the uterine cavity, so as to act directly on the placenta itself.

Such patients ought also to be advised to remain in bed for a long time after their confinement; and, by the use of mild laxatives, to obviate the necessity of strainings at stool.

§ 5. Rupture of the Womb.

Rupture of the uterus is one of the most terrible accidents that can occur in the course of pregnancy or parturition. But as it only claims our attention here, with reference to the difficulties it may create in the delivery of the after-birth, we shall not revert to the minute detail already given in the Fifth Part of this work. (See p. 732.) Several different conditions may here be met with; as, for instance, the child, having partially or wholly escaped into the peritoneal cavity, has permitted the organ to retract; and this retraction of its walls may have driven the placenta into the vagina, and then beyond the vulva;[1] or the placenta may remain adherent to the internal surface of the womb, the child having passed into the peritoneal cavity; or again, it as well as the fœtus may have passed entirely into the cavity of the abdomen. In the former case, there is evidently nothing to be done. In the second, if gastrotomy is resorted to, and it is found impossible to withdraw the placenta through the double wound in the abdomen and womb, owing to the closure of the lips of the uterine rupture, it would be advisable to cut the cord as soon as the child is extracted; and then, by means of some long, solid, and flexible instrument, to bring down the cord through the rupture, the cervix, and the vagina, and out at the vulva; after which the delivery of the placenta is to be effected in the usual way. In the third case, when the after-birth has passed into the peritoneal cavity along with the fœtus, it ought to be extracted immediately after the latter, either by the natural passages, if the child is removed in that way, or through the abdominal incision, if a resort to gastrotomy be deemed necessary.

§ 6. Eclampsia.

For an account of convulsions occurring during the delivery of the after-birth, see the article on *Eclampsia* (p. 788).

[1] This spontaneous expulsion may take place either immediately after the accident or not for several days; as occurred in the case reported by Saucerotte.

PART VI.

THERAPEUTICS.

WE have been careful, in the various chapters of the present work, to call attention to the medicines best adapted to each particular case, and thus have often had occasion to recommend the use of laudanum. We have nothing now to add to what has already been said, but devote a special article to ergot, so often advised by us for the purpose of exciting the weakened or suspended contractions of the womb, and especially as an heroic remedy against hemorrhage. Various substitutes, it is true, have been proposed for it; but as none can compare with it in efficiency, nothing would be gained by their enumeration.

CHAPTER I.

ERGOT.

We shall first study the nature and physical properties of ergot, and finally its therapeutic action.

§ 1. Natural History of Ergot.[1]

The ergot of rye, now so well known and so frequently used in medicine, was at one time regarded as merely the seed altered by disease caused by atmospheric or local influences, such as long-continued rains, poor soil, etc. A second opinion considered it a parasitic fungus occupying the place of the seed. De Candolle classified it among the parasitic fungi under the name of *sclerotium clavus*. This was the generally received opinion until Dr. Léveillé, in a memoir published in 1826, in the *Annals of the Linnæan Society of Paris*, announced that the ergot was in reality an alteration of the grain; and that it was produced by the presence of a parasitic fungus, which he named the *sphacelia segetum*, intending to satisfy by this title both the color of the diseased grain and the sad consequences which result from its use when mixed with bread.

The investigations of M. Tulasne have shown that ergot is not the diseased grain of the rye, but is the *sclerotium* of a fungus, the *claviceps purpurea*, Tulasne. This fungus has three stages in its life-history. The development

[1] The remarks upon the nature and physical properties of ergot are taken in great part from the article upon ergot in the 16th edition of U. S. Dispensatory.—*Ed.*

of the *sphacelia*, or first stage, commences with that of the pistil, which serves as a soil for it. The ovary of the rye consists of a cellular membrane of two coats, the outer of which has a thick parenchyma, white and gorged with juice; the inner is very delicate and green. The sphacelia, when it takes possession of the ovary, identifies itself with the outer parenchyma, and in some measure replaces it, being, as it were, borne by the inner membrane. It rapidly increases, taking the form of the ovary, and almost obliterating its cavity. For some time the parasite is represented entirely by the sphacelia, which is an oblong, fungous mass, almost homogeneous, soft and tender, marked on its surface by numerous sinuous furrows, and having within many irregular cavities, which, as well as the outer coat, are uniformly covered with linear parallel cells. At the base of the sphacelia is produced a compact body, violet-black without and white within, which is the ergot in a rudimentary state. With this commences the second stage in the development of the ergot. The young ergot is everywhere invested by the tissue of the sphacelia, the function of which having been fulfilled it begins to become dry and is much deformed. The ergot, on the contrary, increases in all directions, and soon appears above the glume. If ergot be planted in a suitable soil, germination takes place, little globular prominences appear on its surface and gradually raise themselves upon stems, and finally become perfect pilei or fruiting fungi, which produce rod-like spores, and, falling to the ground, the ergot in the soil germinates and produces pilei, the spores of which, carried up with the juices of rye, become lodged in the ovary, where they begin the same course of life and progress. Rye has generally been thought to be the most subject to the disease in poor and wet soils, and in rainy seasons; intense heat succeeding continued rains has been said to favor its development.

§ 2. Physiological Effects.

Given in small doses to men or non-pregnant women, ergot produces no obvious effects. In the quantity of a half drachm or a drachm it may occasion nausea or vomiting, but in order to produce very distinct symptoms enormous doses must be taken. The most characteristic effect is coldness of the surface, uneasiness in the head, oppression of stomach, diarrhœa, urgent thirst, burning pains in the feet, tetanic spasms, violent convulsions and death. The long-continued and free use of ergot is highly dangerous. Fatal epidemics in different parts of the continent of Europe, particularly in certain provinces of France, have long been ascribed to the use of bread made from rye contaminated with this fungus. Dry gangrene, typhus fever, and disorder of the nervous system attended with convulsions, are the forms of disease which have followed the use of this unwholesome food.

Besides its action upon the uterus, the most important physiological action of the drug is upon the vaso-motor nervous system. It raises remarkably the arterial pressure by producing a general vaso-motor spasm. This spasm is almost certainly the result of a stimulation of the vaso-motor nerve centres, but there are some authorities who believe that it acts peripherally upon the muscular coats of the vessels or nerves connected therewith.

The attention of the medical profession was first called to the use of ergot by Dr. Stearns, of Saratoga County, N. Y., in 1807.

The following preparations of ergot are those most generally employed:

The fluid extract or the wine are usually selected for internal use. The former in doses of one-half a fluiddrachm to half a fluidounce; the latter in doses of two or three fluiddrachms.

The powdered drug may be given in doses of from half a drachm to two drachms.

The best preparation for hypodermic use is a strong aqueous solution of purified extract, carefully filtered, so as to remove all solid particles. Five grains of the extract dissolved in fifteen minims of water may be employed at one dose. (See page 778.)

§ 3. Therapeutical Action.[1]

The action of this medicine is too well ascertained at the present time to permit it to be any longer called in question; though we have only to speak of it here in its obstetrical relations.

Ergot is now recommended by accoucheurs for arousing or accelerating the uterine contractions during labor, and for preventing or remedying inertia of the womb and the hemorrhage which so often accompanies it, after delivery. This action is prompt, and is recognizable by the following signs: the uterine contractions are observed to become more active in the course of ten to fifteen minutes after its administration, more frequent and energetic if they were previously slow or feeble, and reappearing if before suspended. Now, we cannot believe, like the authors who proscribed this medicine as useless, that this is merely a simple coincidence, and that the labor would have been restored without its use, for the thousands of instances in which its administration has always been followed by the same uniform result, will not permit us to consider the latter as the mere effect of chance; and, besides, all those who make use of this article know full well that the contractions which attend the exhibition of ergot have a peculiar character that cannot be mistaken; for as soon as its action is felt they become permanent instead of intermittent; the uterine globe remains hard and contracted, and the pains are continual, though they are marked, it is true, by exacerbations, or paroxysms, and there are moments, as in ordinary labor, when the patient does not appear to suffer at all, and others where she makes loud cries or bearing-down efforts. The periods of repose are, however, only apparent, for the womb is constantly contracted on the product of conception, and the hand, if applied over the belly, always finds this organ in a remarkable state of hardness; there is not that regular succession of repose and contraction which is constantly observed when the labor is spontaneous; and we may further add, that the patients themselves detect a great difference between the pains excited by the medicine and those previously felt in the same or former labors, and they bear them, as a general rule, more impatiently than the latter, complaining particularly of the want of respite. In an hour or an hour and a half after the exhibition of the ergot, its action wears away and soon disappears, so that, if there

[1] See page 1078.

is any necessity, it must be again renewed, or recourse be had to artificial means for terminating the labor.

The permanent character of the contractions produced by ergot makes them very dangerous to the child when they are long continued. The violent retraction of the muscular fibres then renders the circulation difficult, and sometimes even impossible, in those vessels which are distributed between their various layers, and we may readily understand that the fœto-placental functions must be remarkably obstructed. Therefore, it can be prudently administered only when a prompt termination of the labor can be predicted.

This remedy is only to be given during parturition, when the pelvis is well formed, the infant presenting by its cephalic or pelvic extremity, and of course when the position is well ascertained; where no serious obstacle exists at the uterine orifice, in the vagina, or at the external parts; that is to say, when the cervix uteri is sufficiently dilated, or at least soft, supple, and patulous enough to admit of dilatation, or where the membranes are ruptured. On the other hand, its administration ought to be avoided as much as possible in primiparæ, and, if it should become necessary in them, the perineum must be supported with the greatest care, lest it be exposed to a considerable rupture should the delivery prove rapid; in very irritable women, who may have had convulsions either during gestation, or in their previous labors, because the ergot often produces a state of nervous excitement in such persons, which occasionally amounts almost to mania; in plethoric patients, suffering from congestion about the head, which is characterized by flushing and turgescence of the face, by injection of the eyes, headache, &c., &c.: in a word, in all those cases where venesection is obviously indicated; and lastly, in all those women, where the womb, from being endowed with an acute degree of sensibility, is in a state of irritation, and is habitually the seat of pains, or who, in a former labor, might have been affected with an inflammation of this organ.

The spurred rye has likewise been employed successfully in the profuse hemorrhages that follow abortion, which are caused by the retention or tardy separation of the placenta; as also for the floodings that take place after the expulsion of the fœtus, whether before, during, or subsequent to the delivery of the after-birth. We have had occasion, in the article on Hemorrhage, to refer to and insist on its use under such circumstances.

[1] Such also was the opinion, at the time, of the honorable professor alluded to; but, since then, new experiments have somewhat modified his views: for we have heard him affirm, at the Academy of Medicine (in March, 1840), that, in certain cases, the ergoted rye might bring on the regular pains; and, in consequence, he classified this medicine among the measures calculated to produce a premature artificial delivery. But this opinion does not appear to us to be based on a sufficient number of facts to warrant its general adoption.

CHAPTER II.

PUERPERAL INSANITY.

In the consideration of the diseases of pregnancy, reference has already been made under intellectual disorders to puerperal insanity; but the subject is worthy of more extended study and remark, and we have therefore consulted the later works of Bucknill and Tuke, Clouston, and others, and have embodied in a special chapter the more important results obtained by these authors in their extended experience with the subjects of mental disease.

The term *puerperal insanity* has been by some writers applied indiscriminately to cases of mania occurring during gestation, as well as to those occurring immediately after labor, or during the period of lactation or weaning. A more precise division would exclude all cases except those in which the mental aberration comes on within one, or at most two months after labor. The insanity manifesting itself at this time is known as the Insanity of Parturition or Puerperal Mania.

The type of the insanity in the acute stage is generally that of decided *mania*, although melancholia may be noticed quite early, and may occur at intervals with excitement. According to Dr. Batty Tuke, in 73 cases of puerperal insanity, 57 showed the symptoms of mania, 15 of melancholia, and 1 of epileptic insanity. According to the observations of Dr. Fordyce Barker, if the cases which occur in private practice during the first fortnight after labor, and which either recover within a couple of weeks or pass into the stage of dementia or melancholia, and form no part of hospital statistics, could all be aggregated, it would be found that fully 90 per cent. have the original type of mania. Puerperal melancholia rarely, if ever, is developed until the latter half of the month, and these, being the most intractable, are the cases most likely to be transferred to insane hospitals.

Of 60 cases collected by Clouston, 43 were very acute in character and symptoms. 29 of the 43 acute cases were generally maniacal in character, and 14 generally melancholic, with motor excitement, some of each of these classes changing from one state to the other at times. In the mild cases the prevailing character was mental depression, 14 of the 17 being so. In at least 18 of the acutely maniacal cases, the mania amounted to absolute delirium, with no power of attention and no coherence of speech whatever.

This form of insanity, compared with others, is not of rare occurrence, if we may judge from the statistics at hand. Of 2181 females treated in the Royal Edinburgh Asylum, 73 were examples of puerperal insanity proper, or 3.3 per cent. Clouston says: It is a very common form of mental disease, for 5 per cent. of all the cases of insanity among women are puerperal, and I think it is a low estimate that 1 in every 400 labors is followed by it.

The number of patients attacked in lying-in hospitals is said to be very small compared with the number in private practice. Bucknill accounts for this by the quiet, good nursing and sufficient nourishment obtained in hospitals, which favorable conditions are generally absent from the homes of the same class of patients. According to Esquirol, however, patients of the

higher class, abundantly provided with good food, quiet, and comfort, are more frequently the subjects of this disease, which corresponds with the explanation of Barker, that moral causes are the most frequent of all the predisposing and exciting causes of this form of insanity. Most of the patients in the larger hospitals make no sacrifice of domestic comfort or social position in going to the hospital. They are there better off in every respect than in their homes; they suffer no disgrace in being there; there is no feeling of shame. In the higher circles of life, however, as is well understood, the susceptability to the influence of emotional and moral causes is very much greater.

Puerperal insanity is regarded as the most acute of all forms of insanity. The first symptoms of the disease are shown in by far the greater number of cases during the first week after labor. In 92 cases collected by Esquirol, 16 became insane from the first to the fourth day of confinement; 21 became insane from the fifth to the fifteenth day; 17 became insane between the fifteenth and sixtieth day. Sixty days he regards as the extreme limit of the lochial discharge. In 73 cases at the Royal Edinburgh Asylum, 20 certainly, and probably 27, showed signs of insanity from the first to the fifth day after labor, 36 from the fifth to the end of the fourteenth, and 10 or 11 from the fifteenth to the sixtieth day. In 82 cases reported by Ripping, 7.2 per cent. occurred on the first day after delivery, and 42.6 per cent. during the first week. The danger of losing the reason diminishes in proportion as the female is removed from the epoch of confinement.

Puerperal insanity more frequently attacks women in their first confinement. The age at which nursing women, as well as those recently confined, are most subject to mental alienation is from twenty-five to thirty years. Clouston mentions the case of a woman who had 6 attacks of puerperal insanity, having one after the birth of each child she had, and recovered from them all.

Symptoms.—The patient, oftentimes before the brain symptoms are fully developed, shows a sadness of manner or an exaggerated disquietude without evident cause. She cannot sleep. There is an altered expression of countenance, restlessness, and a disposition to talk. The milk and lochia are most generally diminished in amount or entirely suppressed. The tongue is white, sometimes, instead of a slight and scarcely noticeable febrile condition, the pulse and temperature are increased, and the symptoms may indicate inflammation or septicaemia. Of the 60 cases reported by Clouston, 26 cases, or 43 per cent. of the whole, had a temperature over 99°, while 14 cases, or 23 per cent. of the whole, were over 100°. These cases are of a most serious and alarming character. Dr. B. Tuke, in observing upon the presence of the inflammatory pulse, says: "The prognosis is unfavorable." Sometimes there is very acute pain in the head. Hallucinations of hearing occur in about one-third of the cases. Albuminuria may be present.

As the symptoms of insanity become more decided, "the talking is almost incessant, and generally on one particular subject, such as imaginary wrongs done to her by her dearest friends; a total negligence of, and often very strong aversion to, her child and husband are evinced; explosions of anger occur, with vociferations and violent gesticulations; and although the patient

may have been remarkable previously for her correct, modest demeanor and attention to her religious duties, most awful oaths and imprecations are now uttered, and language used which astonishes her friends; the eye is wandering and unsteady, and the hearing most acute. The *suicidal tendency* is not uncommon, especially in cases of melancholia. In 111 cases at Bethlehem Hospital, 32 were effected by it." (Dr. Reid.)

The most common symptom in this disease is *refusal of food*. About half of all the cases must be fed. In many cases the patients pass from the acute stage into one of stupor; a condition of acute dementia, in which there is little apparent perception of what is passing around them, with a tendency to catalepsy. There may be dirty habits, and masturbation is mentioned by Clouston as one to which puerperal cases are very subject.

Causes.—The causes which especially predispose the recently confined to this disease are, hereditary predisposition, dystocia, anæmia, and eclampsia. In the 73 cases of Dr. Tuke, the labor was complicated in 23. "The various irregularities of labor doubtless operate in different ways: those where the suffering has been long-continued depressing the nervous system directly,—those in which large quantities of blood have been lost, producing anæmia of the brain, and, in the case of the child being still-born, a moral shock acting on a brain naturally predisposed to this affection." Among the *exciting causes*, are mental shocks of any kind and moral emotions. According to Sir James Simpson, puerperal mania is most frequently caused by albuminuria. Exposure to cold by suppressing the lochia is mentioned by Esquirol as an exciting cause of insanity.

Prognosis.—The prognosis is very favorable. Clouston gives a recovery rate of 75 per cent.; Bucknill and Tuke give a percentage of recoveries of 64; 80 per cent. of Dr. MacDonald's cases recovered. No recoveries from mental diseases are generally better or more satisfactory than those from puerperal insanity. Dr. Tuke says: "Puerperal mania of itself does not kill; and when you have to combat it alone, not only death is not to be dreaded, but in a very large proportion of cases a return to sanity may be prognosticated." In a few cases the symptoms disappear within a few days, but by far the greater number recover within three months. After six months the prognosis is very unfavorable, although recoveries are known to take place after several years. Where mania has followed puerperal convulsions, the duration, as observed by Barker, has been limited to three or four days, and the patient speedily recovered or died within this period.

Puerperal melancholia, apparently, is slower to change than puerperal mania. The greater number of cures take place between the fourth and sixth months.

Clouston gives a mortality of 8.3 per cent. for 60 cases.

High temperature is a dangerous symptom: of 14 cases in which the temperature was above 100° 5 died, or 35 per cent. Muscular subsultus, with a moving of the hands and twitching of the facial muscles, are unfavorable signs. Persistent refusal to take food is regarded as a bad sign. Menstruation returning before the general strength is improved is apt to be attended with increased mental excitement, and is apt to become menorrhagic.

Treatment.—The greatest number of cases of puerperal insanity are [illegible]

ciated with anæmia, nervous debility, and exhaustion. Bleeding, arterial sedatives, emetics, and cathartics should therefore be avoided. Opium is condemned by Dr. Tuke, in fact all *drugs* seem of no avail according to his observation. Dr. Barker has seen opiates prove of great service in cases complicated with pelvic peritonitis. The indications are to quiet nervous excitement—1st. By means of moral treatment, which includes all that is contained in the word *tact*; kindness of manner with firmness; incessant care and watchfulness; unwavering gentleness and constant patience. 2d. By means of such remedies as will produce sleep and such tonics as will sustain and improve the nutrition of the brain. Barker recommends chloral-hydrate as of immense value, given in 15- or 20-grain doses, well diluted, repeated every two hours until the effect is produced. Those cases in which there is *refusal of food* require the most careful treatment: perseverance by the nurse or friends will generally overcome this refusal to some extent. Should it not, recourse must be had to forcible feeding. Early feeding and stimulants in large quantities with the food is insisted upon by Clouston.

When a patient gets strong in body, and the body-weight becomes normal, every means should be used to restore menstruation. Warm baths at night, aloes, and iron, with a general tonic treatment, are indicated. In cases in which the temperature rises above 100°, quinine in large doses may be given as an antipyretic.

PART VII.

OBSTETRICAL OPERATIONS.

THE indications arising from the various causes of dystocia just studied have been carefully pointed out, and each one, as seen, requires a different operation. This seventh part of the work is devoted to the operative procedures. The first chapter treats of the use of chloroform, which is an invaluable adjuvant in most obstetrical operations. In the second chapter is described the mode of applying the tampon, which, on the ground of utility, may be regarded as an important operation. Finally, we have to treat in the remaining chapters of the manipulations and operations, properly so called.

CHAPTER I.

ON THE USE OF ANÆSTHETICS IN OBSTETRICAL PRACTICE.[1]

In view of the wonderful results obtained by the use of ether in surgical practice, it was altogether natural to inquire whether so efficient a means of avoiding the pain of operations, might not be employed with advantage against the physiological pain which accompanies labor in the human species. But before speculating upon the probable advantages to be derived from its use in this way, prudence suggested the endeavor to foresee the disadvantages also. Might not the torpid condition of the voluntary muscles produced by etherization, extend to the muscles of organic life, and might not that action of the womb which is indispensable to a prosperous termination of labor, be paralyzed thereby? Supposing, even, that the uterus should preserve its contractile powers in the midst of the general paralysis, would not the want of that assistance which it receives from the voluntary contractions of the abdominal muscles, and of that synergic action which is so useful in the termination of labor, render the expulsion of the fœtus very difficult, or even impossible? Might not the health and even the life of the child be endangered by the vapor inhaled? And might not the latter, which has occasioned some serious accidents in surgical practice, prove an addition to the dangers which threaten the female during labor and the lying-in? The previous solution of all these questions is of the highest importance, and we may readily understand the effect they must have had in inspiring with prudence those who were the first to employ anæsthetics against the pains of childbirth. Some of these questions are capable of elucidation by the application of certain pathological facts; others could be solved only by experiment, and this experiment had yet to be performed.

[1] See also page 1118.

Professor Simpson, of the University of Edinburgh, was the first to venture upon the administration of ether in labor. The opportunity presented on the 19th of January, 1847. The woman had a deformed pelvis, and having decided to turn, he thought the occasion a favorable one for determining the influence of inhalation of ether upon the contractions of the uterus; for, supposing the contractility of the organ to be paralyzed by the anæsthesia, the introduction of the hand and evolution of the fœtus would only be facilitated thereby. The result was so satisfactory as to convince Dr. Simpson that, notwithstanding the complete abolition of sensibility, the action of the womb might continue intact. Encouraged by the first trial, he repeated the experiment in several cases of natural and of difficult labor, and on the 10th of February communicated the results to the Obstetrical Society of Edinburgh.

Almost immediately after becoming acquainted with his observations, several English accoucheurs, Murphy (of London), Protheroe Smith, and Landsdown, administered ether with a like success. Fournier Deschamps was the first to use it in France, and that only eight days subsequent to the publication of Dr. Simpson's first observation. In the month of February, in the same year, Professor P. Dubois laid before the Academy of Medicine the result of its administration in six cases of labor under his own notice. In March, it was used by Stoltz, at Strasbourg, and by Delmas, at Montpellier. In August, I made, in connection with Mr. Smith, some experiments at the Clinique d'Accouchements, then under my charge, but the first trials did not seem to me encouraging. Still later, MM. Chailly, Colrat, Villeneuve, Roux, Male, and several others, published their observations. In Germany, Professor Martin (of Jena), and afterwards, Professors Siebold and Grenser (of Leipzig), used ether in several cases of natural and of difficult labor. Lastly, in America, Drs. Channing, Clark, Putnam, and others, were the first to make known the results of their experiments.

In November, 1847, the substitution of chloroform for ether, as proposed by Dr. Simpson, gave a fresh impulse to the use of anæsthetics in obstetrics. The rapid action of the new preparation and its easy administration, were, perhaps, the occasion of a too ready forgetfulness of the dangers to which it might give rise, and were certainly the cause of its enthusiastic reception by at least a large number of English accoucheurs. At present, notwithstanding some opposition, chloroform is employed almost exclusively in obstetrical as well as in surgical practice.

Amongst the questions which would naturally present themselves to the mind of whoever first entertained the idea of using anæsthetics in labor, there are some, which, as we have said, receive a degree of light from known physiological and pathological facts. Of such are those having reference to the probable continuance of the uterine contractions, notwithstanding the complete torpor of the voluntary muscles, and to the more or less important assistance received from the abdominal muscles in labor.

Numerous facts at present authorize the belief that the momentary paralysis of sensation and voluntary motion does not sensibly interfere with the action of the womb.

Dr. Simpson was acquainted with those cases of complete paraplegia, in

which delivery had been effected with its normal regularity and almost without pain; nor was he ignorant of the many instances in which women have given birth to children during the deep stupor of drunkenness; he had often seen labor terminated in patients affected with eclampsia, during the period of coma attending or following the convulsive paroxysms, without their being in the slightest degree conscious of what had occurred, as also the astonishment at their delivery manifested on the return of their senses. Nor are examples rare of the delivery of women, during a lethargy so profound as to be mistaken for death. It is distinctly proved by all these facts, that, notwithstanding the momentary or permanent extinction of volition, sensation, and voluntary motion, the organic contractility may not only continue, but be equal to the expulsion of the fœtus. Hence it was quite probable that the condition produced by the inhalation, resembling as it does in many respects the sleep of drunkenness or the coma of eclampsia, might, like the latter, have its influence restricted to sensation and to the muscles of animal life.

It was to be feared lest the anterior muscles of the abdomen should be paralyzed like those of the extremities, and that their inaction might somewhat retard the expulsive stage. But the happy delivery of paraplegic women, and of such as, notwithstanding a complete prolapsus of the uterus, have, unaided, been delivered of the product of conception, naturally presenting themselves to the mind, allowed of no hesitation on the score of even a probable paralysis of the abdominal muscles. Besides, in the case in which Dr. Simpson employed anæsthetics for the first time, version was to be performed, and he would be able to supply by tractions any deficiency of the expulsive powers.

More fortunate than Dr. Simpson, who at the time of his first experiments had only the rational inductions afforded by physiology and pathological anatomy to support him, we are now able to appeal to experience. Let us, then, with the assistance of the numerous facts now on record, endeavor to elucidate the various questions connected with the use of anæsthetics in obstetric practice.

1. *Of the Effects of Anæsthetics on the Uterine Contractions.*—On this point, as on many others, accoucheurs entertain various opinions. Some regard neither chloroform nor ether as possessing any power to suspend the uterine action: others think that the contractions are always retarded, and quite frequently even stopped entirely. Amidst these contradictory assertions and facts, it is, however, possible to discover the truth. A careful reading of all the observations will show that, with the exception of Paul Dubois, almost all authors are unanimous in the recognition of important changes impressed by the inhalation upon the contractions. These modifications are, besides, very various: thus, whilst M. Stoltz believed that he had observed an increase in frequency and intensity, and Mr. Murphy, whilst turning, declared that he had never before found the operation so difficult, although the patient was under the *full influence* of the agent, we find MM. Bovier, Siebold, Montgomery, &c., asserting that it retards and sometimes even completely suspends the labor. Dr. Denham also affirms, that in six cases in which chloroform had been administered before turning, the opera-

tion was rendered easier, and that its happy effect was especially evident in one case, where the introduction of the hand having been fruitlessly attempted before inhalation, it was effected very easily after it. We shall endeavor to account for this dissidence hereafter.

Whatever the exact truth may be, in an unprejudiced mind no doubt can exist of its being proved by numerous facts, that when chloroform is taken so moderately as to blunt and almost extinguish sensibility without entirely depriving the patient of the power of motion or of self-consciousness, it has, ordinarily, no influence over the contractile power of the uterus; but that when carried to complete anæsthesia, the contractions may be diminished both in frequency and intensity to the point of complete extinction. The latter fact is acknowledged by Dr. Simpson himself, and he regards it as of possible occurrence in some cases of moderate anæsthesia. The degree of the latter, he remarks, which some patients are able to bear without the womb being affected, is exceedingly variable. Some are thrown into a profound slumber without interference with the uterine action. Others, on the contrary, experience interruption of the contractions by a much slighter degree of anæsthesia. These individual predispositions explain Mr. Montgomery's observations of the manifest diminution of the uterine contractions under the sedative influence of chloroform without the woman being insensible to pain. Besides, according to the majority of English practitioners, the retardation or the suspension of labor is the indication *for the particular case*, that the dose of the agent which the patient might have supported without inconvenience has been exceeded, and the best means, according to Dr. Simpson, of restoring energy to the uterus, is to cease the inhalations for some moments and then resume them in more moderate proportions, as soon as the patient shall evince sensibility. It is stated by the Edinburgh accoucheur, that the return of the contractions on withholding the chloroform is delayed but a few minutes only; such, also, is the view of Den ham, Murphy, and others. Mr. Montgomery, however, has less confidence in this prompt return of the contractions. In a very recent case he witnessed an interruption of the labor by so feeble a dose of the chloroform, that the patient was all the while expressing with volubility the delicious sensations she experienced; and notwithstanding the suspension of inhalation, the uterus remained inert for some hours before resuming its original activity. I have seen, says the Dublin professor, several similar cases.

1. To recapitulate: In the majority of instances, the contractions are unaffected by the inhalation of chloroform. 2. When the anæsthesia is pushed too far, the labor is often suspended. 3. In certain individuals, the same result may be produced by moderate doses of the agent, and that before the loss of sensibility and consciousness.

This difference in the results, setting aside certain altogether exceptional and as yet inexplicable idiosyncrasies, is manifestly due to the extent and duration of the etherization. The various facts, says M. Bouisson, which have served as a basis to so many different opinions, are but the simple expression of greater or less degrees of anæsthesia, and the phenomena presented by the uterus in regard to sensibility and contractility, are themselves included in the general laws of anæsthesia. We are, in fact, perfectly well

aware, that the participation of the organic movements in the depression which the inhalations produce in all the powers of the economy, is to be reckoned amongst the ultimate phenomena of etherization.

2. *Influence of Anæsthetics upon the Contraction of the Abdominal Muscles.* It is well known that in the last stage of labor the womb seems to call to its aid the action of the voluntary muscles, and that the efforts of the female assist in overcoming the obstacles to the passage of the fœtus. It would appear as though, being dependent upon the animal life, the action of those muscles which accomplish the effort would be destroyed by the ether or chloroform, as is that of the muscles of the extremities. Now, according to the majority of accoucheurs, such is not usually the case, but that unless the anæsthesia be carried farther than prudence would dictate, the auxiliary power of the abdominal muscles is not wanting to the uterine contraction. My friend M. Longet thus attempts to explain this singular phenomena. He first calls attention to the fact, that in the midst of the complete collapse, the respiratory movements are still accomplished. Now the effort in general, and that which accompanies labor in particular, are but a modification, a transitory change in the respiratory act; it is a state requiring an energetic contraction of the muscles of the chest, diaphragm, and abdominal parietes. Since in etherization the respiration is maintained in all its integrity, volition being absent, and the medulla oblongata continues to excite all the muscles that concur in its accomplishment, the effort which is the result of the action of these muscles, those of the abdomen included, should also continue to be produced. I would also willingly add, with M. Bouisson, that since it is at the present day demonstrated that the reflex or excito-motor power of the spinal marrow, which produces movements without the participation of the will, is not abolished by etherization except when carried to an extreme degree, the part which is played by the abdominal muscles in parturition may properly be regarded as reflex in its nature. Their manifest relation with the viscera of the lower part of the abdomen leads, naturally, to the supposition that the excitement emanating from the uterus during the act, is directly reflected by the spinal marrow upon the muscular planes of the abdomen. What tends to prove it is the fact that the abdominal muscles may refuse the contingent of force which they contribute to this act, provided the etherization be carried so far as to abolish the reflex power, whilst they continue to act, though more feebly, it is true, as muscles of respiration (Bouisson). I was, on one occasion, enabled to verify the correctness of this observation of the Montpellier professor.

3. *Influence of Anæsthetics on the Resistance of the Perineum.* One of the advantages usually attributed to the use of ether or chloroform is such a diminished resistance of the perineum as to facilitate the expulsion of the fœtus, and to prevent almost certainly the ruptures which it so often suffers in labor. Were I to rely only upon my personal experience, I should find it difficult to arrive at a definite conclusion, particularly as I have witnessed very different results. Thus, like Messrs. Dubois, Chailly, and others, I have sometimes known the perineum yield and distend with great facility, though more commonly, even when the anæsthesia was complete, it remained as resistant as ever, and even, as in the case reported by M. Villeneuve

(of Marseilles), in three instances, to be ruptured very badly.[1] On a still more recent occasion, M. Danyau and myself were obliged to incise each side of the vulvar orifice very deeply, the patient being completely under the influence of chloroform. I am unable to say why these differences should exist, because the anæsthesia was perfect in all the cases just mentioned; so that different degrees of this condition cannot be alleged in explanation. Perhaps it will be well to remember how very variable is the resistance offered by the perineum in different individuals, and how very difficult it is to foresee what will occur in any particular case. Every day's practice shows how liable our predictions are to be falsified by the event.

Again, supposing that under the influence of the pressure which these muscles have to sustain, the reflex action of the spinal marrow is unable to produce their contraction in the efforts, involuntary though they be; supposing, we repeat, that they are paralyzed in the etherized female, it is not to be credited that the entire resistance of the perineum is on that account ever suspended. The fact is, that the resistance is ordinarily due quite as much to the aponeurotic planes of the pelvic floor, and to the sometimes very large amount of fatty tissue situated between the different layers, as to the muscular fibres themselves. In those who have borne children, and in whom the perineum presents but slight resistance, the muscles of this region are at least quite as fully developed and as strong as in primiparous females. To what, then, can be due the facility with which the fœtus is expelled, if not to the greater elasticity of the aponeurotic planes, which, having suffered distention in previous labors, have their suppleness increased thereby? Since the chloroform can have no effect upon them, it is no cause for astonishment that after its administration the resistance of the perineum should continue.

Hence we may conclude that: 1. When properly administered and in moderate doses, anæsthetic agents do not interfere with the regular course of the uterine contractions; and that whenever their administration is followed by the cessation or weakening of the efforts, the effect ought not to be attributed to the agent, but to the abuse which has been made of it. 2. That it is not yet sufficiently shown that during the anæsthetic slumber, the abdominal muscles continue to aid, by their contraction, the expulsive efforts of the womb. 3. That fresh observations are necessary to settle definitely the influence of chloroform upon the resistance of the perineum.

Before determining what cases indicate or contraindicate the use of chloroform, it remains for us to state what is proved by experience regarding the influence of chloroform upon the health of both mother and child.

1. *Effect upon the mother's health.*— Accoucheurs who have often used chloroform, are almost unanimous in the declaration that it has never had the least mischievous effect upon the mother's health, whilst in all cases it

[1] Rupture of the perineum does not prove, however, that the resistance may not have been lessened by the use of chloroform. In two cases, indeed, it seemed to me that the great rapidity with which the distention and thinning took place facilitated the rupture. This stretching, resembling precisely what a piece of India rubber would undergo, was effected so quickly by the very strong pains, that there occurred, first, a sort of fraying, followed by extensive rupture of the perineum.

has spared them the sufferings of the last expulsive pains. None of my patients, says Dr. Simpson, have been conscious of them; and several, through their confidence in etherization, have been spared the fears which they usually suffered toward the end of their preceding pregnancies, in anticipation of the coming labor. By exempting women from the terminal sufferings, the anæsthesia husbands their strength, and avoids the nervous exhaustion which follows a painful labor. Some, who were already mothers, declared in grateful terms their condition to be incomparably better than after their previous labors. Their recovery, continues the same author, is more rapid, and consecutive inflammations are much rarer or less serious than usual.

I am not yet convinced, so far at least as regards natural labor, that this last proposition is fairly demonstrated; and nothing in the facts yet known, those even of Dr. Simpson included, appear to me of a character to prove its exactness. In natural labor the fatigue is moderate, and the remembrance of it soon abolished by the happiness of maternity. The lying-in demands always the same precautions, whether chloroform be used or not, and the time of getting up is nearly always the same. Finally, in an epidemic of puerperal fever at Edinburgh, the women who had used inhalations were not more exempt from the disease than those who had not.

I would even add, that in tedious labors the gravity of consecutive accidents has not been sensibly diminished by the use of chloroform. Its only incontestable effect is to abolish pain, and prevent the considerable nervous disturbance sometimes consequent thereto. This result is, doubtless, of importance, but, except in some very exceptional cases, the pain is not fatal of itself, and the nervous shock is generally avoided. Metritis, deep-seated suppurations, inflammations, and gangrenous eschars of the soft parts of the pelvis, are consequences of the violent uterine efforts. Now, as Montgomery has shown, the only effect of chloroform is to remove the pain, leaving intact all the other consequences of difficult labors.

Another incontestable advantage of chloroform is that of facilitating certain obstetrical operations. The uncontrollable and disordered movements of the agonized female hinder the operator greatly; but the sleep which she enjoys during the inhalation, and the complete insensibility of all the organs, enable her quietly to bear the most painful operations.

The annihilation of pain in all cases, the prevention of the nervous shock which is sometimes the consequence of too painful or too prolonged a labor, and the facilitation of obstetrical manœuvres, are, therefore, the only indisputable advantages to be derived from the use of chloroform.

Are not these advantages counterbalanced by serious inconveniences? Such is the opinion of some accoucheurs, though they have, in my opinion, exaggerated both their frequency and gravity. We are now able to estimate its power of suppressing the pains of labor: prudently administered, it in no respect alters the regularity and power of the contractions; but is it altogether the same as regards the contractility of the tissue, and may not the retraction of the womb after labor be in some degree modified by the previous use of anæsthetics? I confess the want of an entire assurance upon this point and am inclined to believe that they have not, in some

cases at least, been altogether without influence in the production of subsequent inertia and hemorrhage. Two cases of slight hemorrhage are quoted by Duncan, one of which, it is true, occurring in a twin labor with extreme distention of the uterus, is thereby sufficiently accounted for; but the other took place six hours after delivery, without any appreciable cause. Dr. Channing has met with 4 cases of hemorrhage in 78 of anæsthesia. In one case it was internal, and happened one hour after delivery; in another, the woman half fainted immediately upon the termination of labor and he found the uterus much enlarged and filled with clots, upon the removal of which, the organ contracted, and there was no further loss. In a third case, a serious hemorrhage occurred immediately after delivery. The fourth observation is less conclusive, on account of the patient having experienced losses after previous labors, and because the delivery of the placenta was made difficult by adhesion. Dr. Montgomery declares, as his personal experience, that when the influence of the chloroform is kept up until the labor is ended, the patient is more or less exposed to hemorrhage from inertia and to retention of the placenta. The experience of several of my brother practitioners, he adds, has been similar to my own.

I am well aware that in all these instances the hemorrhage may have been due to various circumstances, and there is nothing to show that chloroform was necessarily the cause; still, it is well to be aware of them, were it only to excite prudence in the use of the agent; for, since by too large a dose the exercise of the organic contractility has sometimes been suspended, why may not the same dose diminish the contractility of the tissue? In practice, these facts ought not to be lost sight of, and I think that, immediately after delivery, it would be prudent to administer some ergot.

In certain surgical operations, death has resulted immediately from the administration of chloroform. Is not the supposition both probable and reasonable, says Dr. Montgomery, that a similar misfortune might happen to a woman in labor? Doubtless it is possible; but happily, although a great number of women have used inhalation, not a case can be mentioned in which sudden death can be reasonably attributed thereto; for I cannot accept as such the following related by Gream. A young woman had just been delivered of one child, and chloroform was administered before the expulsion of the second; death ensued in half an hour. No further detail is given. In two other cases mentioned by the same author, death occurred at a still later period after delivery. The patients whom the surgeons have had the misfortune to lose, did not die in this manner; for, in their cases, it was during the administration of the agent that life became extinct; it is, therefore, because in the observations of Gream a longer or shorter time had elapsed between the cessation of inhalation and death, that I cannot regard the chloroform as chargeable with the fatal result.

With still less reason has it been reproached with the production of eclampsia, by increasing the cerebral congestion, which the exertions of labor have of themselves a tendency to produce. For, although Wood has quoted a case of convulsions occurring in an etherized woman in the last stages of labor we are now in possession of enough facts to prove that the

administration of chloroform during convulsive attacks, lessens their frequency, and sometimes puts an end to them altogether.

Inhalation has also been accused of the production of insanity; of which, says Channing, there is not a single well-established case. In reference to this point, he cites the following observation by one of his countrymen. An insane woman had in a preceding labor suffered from extreme agitation, which was the occasion of serious difficulty. In her last labor, ether was administered, thanks to which, the patient was perfectly quiet, and all passed over admirably.

2. *Effect of Chloroform upon the Life and Health of the Fœtus.*—Whatever difference of opinion may still remain respecting the influence of chloroform upon the health of the mother, no one doubts its entire innocence as regards the fœtus. In the immense majority of cases, the new-born child presents its usual appearance; its cries are neither weaker, nor heard less promptly, nor does its viability appear to be in any way injured. Thus have the gloomy previsions of certain physiologists been falsified by experience. The conclusions which M. Amussat thought himself entitled to draw from his experiments were contradicted by the ulterior researches of M. Renault.

Indications.—In what cases is the accoucheur justified in the employment of chloroform? This question is variously answered in different countries. Dr. Simpson, and with him quite a large number of his countrymen, recommend it unhesitatingly in all labors, whether natural or difficult. In France, on the contrary, it is confined almost exclusively to cases of difficult parturition. We adopt unhesitatingly the latter position, and a few words will suffice to explain the motives of our preference.

Whilst regarding the use of chloroform as devoid of danger in the majority of cases, we cannot entirely forget the misfortunes of certain surgeons, who had, nevertheless, taken the best precautions to avoid them. Now, though it be allowable to subject a patient to some danger, in order to spare him the intense suffering of an amputation or any other bloody operation, are we sufficiently authorized to do so when the regular accomplishment of a function is concerned? And, after all, is the suffering of child-birth, in simple cases, so grave and terrible? Do we not see women delivered almost without pain? To speak only of what is most common, do they not often preserve their calmness and gayety to the end of the labor? Do they not often complain of the repose afforded by the intervals between the pains, and ardently desire their return, in the conviction that each is a step toward delivery? Why, therefore, with the simple object of sparing them some suffering, which, after all, they endure courageously, deprive them of the caresses of the husband, the condolence of their relatives, and deaden the imagination, already teeming with the joys of maternity? Why, especially, should they be deprived of the ineffable happiness of hearing the first cry of the new-born child? Instead of the pleasant chatting in which women so often indulge, instead of those maternal aspirations and dreams of the future which soothe the young mother, what do we observe after the anæsthetic inhalations? A deep sleep, resembling more or less the coma of inebriation, or concussion of the brain, a complete annihilation of the sensorial and intellectual faculties, is the lot of the mother; an always increasing

solicitude that of her attendants. Finally, we may add, that, supposing the physician to be devoid of all fear, he is obliged to remain constantly by the side of his patient to administer the agent personally, and to watch attentively the state of the pulse, of the breathing, and of the heart.

As a justification of the use of anæsthetics in ordinary labors, it has been said that they favor the dilatation of the mouth of the womb, and by lessening the resistance of the perineum also shorten the period of expulsion. We have already seen that the diminution of the resistance of the perineum is not sufficiently proved; and the same may be said, I believe, of the rapidity with which the dilatation of the orifice is effected. However it may be, upon consulting the published observations, it is not discoverable that, in the cases in which chloroform has been employed, the duration of the labors, as compared with preceding ones, has been sensibly shortened.

Besides, the duration of a labor becomes dangerous for either mother or child only as it exceeds the natural limits, and of the latter case only are we speaking at present.

The case is different when some unfortunate complication disturbs or interferes with the course of nature. It will have been seen, on reading this work, that we very often have spoken in favor of the use of chloroform, and we shall now proceed to recapitulate the different cases in which we feel justified in recommending it.

It may be especially useful: 1. In calming the extreme agitation and mental excitement which labor often produces in very nervous women. 2. In those cases in which labor appears to be suspended or much retarded by the pain occasioned by previous disease, or such as may supervene during labor (vomiting, cramps, colic, compression of the sciatic nerve). Dr. Montgomery, who certainly is no enthusiast, states that he had witnessed a case, in which he certainly would have used chloroform had he been acquainted with it at the time: the sphincter ani muscle was affected with so violent a spasmodic pain as almost to deprive the patient of reason. 3. It seems to us particularly indicated by those irregular or partial contractions, which, notwithstanding the intense and almost constant pain which they occasion, have no effect to advance the labor. We might even think, with M. Bèle, that chloroform, which must be exhibited in very large doses to suspend the normal and rhythmical contractions of the uterus, would act much more promptly in stopping the irregular contractions. 4. Spasmodic contraction and rigidity of the cervix uteri have sometimes been favorably affected by inhalation. As this part of the uterus receives some spinal nerves, it becomes, to a certain extent, a portion of the muscular apparatus of animal life. Facts are, however, as yet too few to enable us to determine the question.

When the last edition of this work was published, I was not sufficiently informed in respect to the usefulness of anæsthetics in their treatment of eclampsia. Besides, having had no personal experience, the cases I had read of, those quoted so abundantly by Channing included, still left me in doubt as to their utility. This being the case, I came to no definite conclusion, leaving the question for decision in the future. Since then, the publication of further observations, as well as my own experience, lead me

to advise the use of chloroform. It has seemed to me especially useful when the convulsions begin during pregnancy, or at an early period of labor, when blood-letting, purgation, revulsives to the skin, &c., have all been tried and the attacks continue as severe as ever. The same remark applies to their occurrence only after delivery, or when, having begun during labor, they persist after the child is born. Under the latter circumstances, however, I think it important not to stop the inhalations too soon after the attacks have ceased. At any rate, it were prudent to stand prepared to recommence them should the convulsions be renewed.

Obstetrical Operations.—Not only does chloroform abolish the great pain produced by various obstetrical operations and relieve the patient from the dread which they inspire, but by rendering her motionless, greatly facilitate the manœuvre. It is, therefore, no despicable auxiliary, provided the nature of the services required of it be well understood. Turning, for example, would certainly be facilitated by the immobility and insensibility of the patient, but not at all by any fancied suspension of the physiological contractions; only the sensibility and irritability of the organ being destroyed, it is not irritated by the presence of the hand, and the usual spasmodic contraction does not occur. To expect other assistance from the chloroform, to propose, for example, overcoming by its aid the difficulties sometimes presented by a long and strongly contracted uterus, would be asking of it more than it can yield.

If ever symphyseotomy or the Cæsarean operation be decided upon, I should think the administration of chloroform as likely to be useful as in any other great surgical operation. Finally, the difficulties attendant upon the delivery of the placenta from its abnormal adhesions, and from irregular contraction of the uterus, sometimes require proceedings which are very painful to the female. Anæsthetics may here render the same services as in version. It is, however, necessary not to administer them too freely, for, independently of the dangers of which we have spoken, it might be feared lest by paralyzing the contractile powers of the womb, they should expose the patient to inertia and consecutive hemorrhage.

Before finishing the study of the indications for the use of chloroform, we add a few remarks on its administration to pregnant women and nurses.

During Pregnancy.—Is the somewhat free use of anæsthetics during pregnancy capable of exciting premature contraction of the womb, or of exerting any deleterious influence upon the health or life of the child? In reference to this question, M. Blot mentions in his thesis three cases, two of which came from M. Chassaignac: In the first case the woman had, *three days after* the inhalation, uterine and lumbar pains which yielded readily to opiates; the pregnancy, however, pursuing its regular course. Another patient, five months advanced, presented nothing unusual. The third observation, borrowed from Robinson, had reference to a young woman who, in the fifth month of her third pregnancy, breathed chloroform for the relief of toothache, remaining in a state of demi-stupor for half an hour. Shortly after, abdominal pains came on, which increased, and in a few days ended in abortion. This last case is the only one to which I attribute some im-

portance, and if it should recur in other instances, would show the importance of great caution in the use of inhalations during pregnancy.

Whilst Nursing.—M. Blot also mentions in his thesis two facts tending to prove that the chloroform inhaled may pass into the secretions, and that occurring in a nurse, for example, might have a bad effect upon the child if sufficient time were not allowed to elapse between the period of inhalation and that of suckling. A mother put her child to the breast three hours after breathing chloroform, and in a few moments it fell into a profound sleep, which lasted for eight hours. After the sleep, came on a state of excitement which continued for two days (Scanzoni). An analogous case is reported by M. Chassaignac. It would seem prudent, therefore, to delay nursing in such cases for seven, eight, or ten hours.

Mode of Administration.—The plan described by Dr. Simpson is the one usually followed. It consists, as is well known, in placing near the nostrils and mouth a concave sponge, or a handkerchief folded into a cone, after having poured into the concavity a drachm or two of chloroform. The handkerchief ought to be held rather above the opening of the nostrils, for the weight of the chloroform being rather greater than that of the air, it would otherwise fall, and not enter the mouth or the nostrils. The sponge should be held at some distance from the face, so as to allow a free passage to air, and prevent contact of the fluid with the skin and mucous membrane. If this precaution be not taken, little vesicles, and even small superficial eschars, will be formed. During the interval of the inhalations, the evaporation of the chloroform is prevented by closing the hollow of the handkerchief by the corners or with the hand.

Dr. Simpson recommends beginning with a strong inhalation, and at the outset, to cause enough to be breathed to produce complete somnolence. He attributes the loquacity, delirium, spasms, and extreme agitation observed in certain subjects, to beginning with too small a dose. This advice, which is very proper if ether be employed, is not of equal value if chloroform be used. The latter generally produces much less excitement, and throws the patient at once into a tranquil sleep. The cough and pulmonary irritation which they sometimes occasion depend either upon the bad quality of the agent or the holding of the sponge too near the nostrils at the outset, thus causing too much of the vapor to be respired at a time.

When an operation to last but a few minutes is to be performed, it is proper, as in surgical practice, to induce profound slumber, and to continue inhalation whilst the operation is going on. But if it be intended merely to moderate the general excitability of the female, to abolish a pain which is foreign to the labor, or to modify partial, irregular, or tetanic contractions, it is necessary, after quietness is obtained, to remove the sponge in order to allow of free respiration, and to be content with a few slight inhalations at the beginning of every contraction. Three or four pains may sometimes be allowed to pass without applying the sponge, having recourse to it only when the patient complains of suffering. These repeated inhalations are sufficient to keep the patient in a state in which self-consciousness is lost, and which may thus be prolonged for several hours without inconvenience. What we have to avoid, adds Dr. Simpson, is either too much or too little

By too large a dose, the contractions may be suspended; by too small a one, much excitement is produced. To calm the latter, increase the dose; to remedy the suspension of the pains, withhold the chloroform for some time.

It is a singular fact, that large inhalations are less likely to suspend the contractions in the second than in the first stage of labor, and, consequently, there is then less inconvenience in administering them to a smaller extent. Let it not be imagined, however, that in order to produce complete anæsthesia, it is necessary to carry the inhalations so far as to produce noisy respiration, as in surgical practice. It is rarely needful to go so far. The amounts required to produce sleep and immobility also vary greatly in different individuals.

The patients are calm during the intervals between the pains; at the return of the contractions they indicate to the accoucheur by more or less motion, and by slight groaning, that sensation is not completely abolished, and that it is proper to repeat the inhalation.

So long as the etherization is continued, the greatest silence should be maintained about the bed of the patient, for the general excitement and loquacity produced by the first doses are sometimes augmented by noise.

CHAPTER II.

THE TAMPON.

[The tampon is a sort of plug inserted in the vagina for the purpose of arresting a flow of blood. From its simplicity, it might be regarded as a sort of dressing, whilst its importance justifies its being classed with the operations proper, and may be compared with the plugging of the nasal fossæ.

In several passages of the present work, especially on pages 584, 778, 785, and 907, we have described at length the cases in which it should be resorted to, and it now remains to describe the way of applying it.

Leroux (of Dijon), has the credit of introducing the tampon into practice (1776). His plan was, to fill the vagina with linen or tow, previously saturated with vinegar, which liquid, he thought, would cause the blood to coagulate more quickly and perfectly. The application is now generally made as follows: enough charpie to fill a common wash-basin is provided, the quantity, although apparently large, being really hardly sufficient, on account of the loss of bulk by compression and the great distensibility of the vagina. The charpie is formed into pellets moderately compressed, and each tied to the end of a strong thread for the purpose of withdrawing it readily when it is thought proper to remove it.

When charpie is not at hand, tow or cotton may be substituted. As time is always consumed in the preparation of a tampon, everything should be made ready beforehand as soon as there is reason to suppose that a serious hemorrhage is likely to occur.

To apply it, the patient is placed across the bed with the seat at the edge of the mattress and the limbs held apart by assistants. The pellets are then to be introduced successively into the vagina. The first ones being applied directly to the neck of the womb, where they are held whilst the culs-de-sac are filled compactly with others. The vagina is thus to be filled throughout its whole extent, taking

care that no space is left unoccupied, for the plugging will not be well done unless the canal be filled to distention with the compressed material. Thick wads of the substance used, are then to be applied to the vulva in order to support and retain the pellet, and the whole to be kept *in situ* by compresses and a T-bandage drawn tightly.

I dwell purposely on these details, because a well-applied tampon is an heroic measure in the treatment of certain hemorrhages; but if badly or imperfectly managed, it does not prevent the effusion of blood and occasions the loss of time. The pellets may be introduced into the vagina in two different ways: sometimes by means of a speculum, to the bottom of which the charpie is carried, whilst at others, and, as we think, preferably, two fingers are introduced and the pellets slipped in upon them.

The advice of Leroux, to saturate the charpie with vinegar, is now generally disregarded, the pellets being lightly greased with cerate which facilitates their introduction and makes them less permeable to blood. In case of insertion of the placenta upon the neck of the womb it might be of advantage to saturate the first pellets in a solution of perchloride of iron. The use of the latter preparation is not unobjectionable and will rarely be necessary when the tampon is carefully applied.

The effect of the tampon is to arrest the blood, which then coagulates progressively up to the orifices of the ruptured utero-placental vessels and thus soon checks the hemorrhage. It has also another effect: it irritates the neck of the womb and causes the organ to contract, which may, on the one hand, assist in arresting the blood, and on the other, conduce to the expulsion of the ovum. This would be an advantage toward the end of pregnancy, but a serious inconvenience in the earlier months. On this account, the tampon is more especially indicated when the fœtus is viable, and ought not to be used before then unless depletion of the womb seems necessary to save the life of the woman.

The presence of the tampon occasions more or less discomfort. Some women can bear it for several days, whilst to others it becomes intolerable after a few hours. These individual differences must be taken into account when it becomes a question as to the time for its removal. Still another effect of its application, may be retention of urine caused by pressure upon the urethra. This must be relieved twice or thrice in the twenty-four hours by the use of the catheter, which requires, however, that the pellets nearest the vulva should first be removed, though they must be replaced when the operation is completed.

As a general rule, the tampon may be allowed to remain for twenty-four hours at least. Then it ought to be removed for the purpose of ascertaining the effect produced upon the neck of the uterus; and the opportunity may be taken to wash out the vagina by means of an injection. Another tampon, prepared beforehand, should replace the first one if deemed necessary. When labor has begun, the removal should be made rather oftener in order to watch its progress. It sometimes happens that the plug is forced out by the descending head of the child, in spite of the retaining bandage. It is evident that when the expulsive stage begins, the presence of the tampon will be more injurious than useful.

In most cases, it were better to allow the tampon to remain too long, than to withdraw it prematurely. Its removal is effected by drawing successively upon the threads attached to the pellets, beginning with the last inserted. It is very readily done, the only difficulty arising from the commingling of the threads, which often makes several trials necessary. To remedy this slight inconvenience, it was proposed to make the tampon like the tail of a kite, attaching all the pellets to the same thread at intervals. When so constructed, it would certainly be more readily withdrawn, but as it cannot be applied with the same facility, we prefer the common method.

In conclusion, I repeat that a well-applied tampon rarely fails to accomplish its

object, but very often the operation is badly performed. To do it properly often requires considerable time, and the necessary material is not always at hand, in which case something else must be substituted. Chailly used for the purpose a gum-elastic bladder which he passed into the vagina and then inflated so as to fill and distend the canal. The bladder, however, on account of its rounded form, adapts itself less perfectly to the inequalities of the os tincæ and of the two culs-de-sac of the vagina; its polished surface, also, is less favorable to the stoppage and coagulation of the blood than are the masses of charpie. To meet this defect, the English encase the bladder with a covering made of sponge, — which, however useful, is not absolutely necessary. The advantage of the apparatus consists in its ready application, whilst its management is so simple that it can be explained and put in charge of an attendant at the bedside of a patient threatened with hemorrhage. On these accounts, we are unwilling to reject it, but recommend that in making a selection, preference be given to a globe with very supple walls, which should be made distensible by rubbing in the hands and successive inflations in order to enable it to conform better to the shape of the vagina. Finally, we prefer the injection of water to inflation, because the air is too susceptible of compression. Notwithstanding all these precautions, it should be understood that we still prefer plugging by means of charpie, though recognizing the great advantage of the gum-elastic globe as a temporary tampon.]

CHAPTER III.

OF VERSION.

VERSION is an operation by which one of the two extremities of the child is brought to the superior strait: it therefore exhibits two varieties, in one of which the operator proposes to bring down the feet, and hence this is called *pelvic* or *podalic* version; while in the other he attempts to deliver by the head, which is on that account denominated *cephalic* version.

Cephalic version was almost exclusively practised from the time of Hippocrates until that of Ambrose Paré, that is to say, down to the latter half of the sixteenth century. Celsus advised that when the child is dead, and the head cannot be reached without too great difficulty, the feet should be sought after. Ætius and Paulus Ægineta were the first among the ancients to recommend pelvic version when the child is living. But since the days of Paré, or rather since those of Guillemeau, his pupil, the pelvic version has been recommended as applicable to all cases; and the cephalic reduction was almost entirely forgotten, until toward the end of the last century, when Flamand, and, somewhat later, Osiander, exaggerating, doubtless, the inconveniences, difficulties, and disastrous consequences resulting from the pelvic version, proposed a return to the precepts of Hippocrates; and suggested the cephalic one in almost all cases where the hand alone is sufficient to terminate the labor. The doctrine of the Strasbourg professor was favorably received in Germany, but was too severely criticised by the school of Paris. Indeed, Baudelocque scarcely speaks of it, and Gardien restricts its application to a very limited number of cases, while Madame Lachapelle formally rejects it. But we shall see hereafter, when studying the respec-

tive value of these two operations, that at the present day it would be improper to embrace either opinion exclusively; for some cases are better suited to the cephalic version, while there are others, on the contrary, where the pelvic one is alone practicable; consequently, both operations should be retained in practice, leaving to the judgment of the accoucheur to determine the cases in which the one or the other ought to be preferred.

Both operations may be performed shortly before labor, during labor before the membranes are ruptured, or during labor but not until after the membranes are ruptured. In the latter case they almost always require the hand to be passed into the womb, whilst in the former this is very rarely necessary, inasmuch as the presentation can be changed by placing the woman in a suitable position, and applying pressure through the abdominal walls. This constitutes version by external manipulation.

ARTICLE I.

VERSION BY EXTERNAL MANIPULATION.[1]

Version by external manipulation was vaguely referred to by Hippocrates, and more distinctly advised by Jacob Rueff and Mercurius Scipio, yet it passed into oblivion until the commencement of the present century (1812), when Wigand addressed to the Academies of Berlin and Paris, a memoir comprising a complete history of the operation. Wigand's paper was probably lost in France, since it is mentioned in none of our classical works, and we remained ignorant of the wise counsels of the German accoucheur. I ought, however, to add, that, in opposition to the views of Baudelocque, Madame Lachapelle, Capuron, and others, M. Velpeau had indicated (1835) the propriety of performing cephalic version in some cases by means of external manipulation. M. Lécorché-Colombe, also (1836), both advised, and several times executed this operation at the Clinique, and I myself, in previous editions of this work, discussed more clearly than my countrymen, the cases in which it seemed to me that it might be performed with advantage.[2]

It should, however, be said that no one amongst us had treated the question as fully as M. Mattei, who, although exaggerating the advantages of the operation, and needlessly multiplying the indications for it, had at least the merit of again calling attention to a too much neglected subject. Indeed, we probably owe to the exaggerations of our countrymen, the ability to read in French, the excellent translation made by MM. Belin and Hergot of Wigand's paper. Two pupils of the Paris school, Drs. Ducellier and Nivert, have, since then, made this subject their study in their inaugural thesis; so that, in consequence of all these labors and of the clinical instructions of Professor Stoltz, the teachings of the Hamburg professor are now well known. Thanks to this translation, as well as to the clinical teaching

[1] See also page 1111.

[2] I am, therefore, astonished to read in M. Belin's translation, that M. Cazeaux, in his edition of 1853, leaves us ignorant of both when and how the operation ought to be performed, and that I had been content with saying, in reference to cephalic version, that external manipulation, wisely conducted, had quite frequently been successful in changing the position of the trunk,—this, too, when no less than five pages of my book are devoted to discussing the indications of the operation.

of Professor Stoltz, the doctrines of the Hamburg professor will soon be popular in France.

External manipulation, performed with the object of bringing to the superior strait one of the fœtal extremities originally more or less remote from it, has been advised:

1. Before labor;
2. During labor and before rupture of the membranes;
3. During labor and after rupture of the membranes.

A. *Before Labor.*—Some accoucheurs have advised that external manipulation be resorted to in the last fortnight of pregnancy, and we have ourselves done so after the example of M. Lécorché-Colombe. M. Mattei, however, advises, of late years, that the version be performed from the sixth or seventh month. We think this can readily be done in most cases, at least where the presentations are transverse or oblique, though we believe that generally the operation will prove useless. When, in fact, the longitudinal axis of the fœtus is replaced in the axis of the superior strait, the form of the uterus, which, as shown by M. Hergott, is very probably the cause of the faulty position of the child, remains unchanged, so that the latter will gradually resume its primitive position; after a few days the extremity, which has been brought to the superior strait, no longer being found there. I have seen this happen several times. Therefore, as the bandages devised for compressing the sides of the abdomen with the view of lessening its transverse diameter and retaining the fœtus in the position given it, would be insupportable for two months, I agree with Wigand, that it is better to await the commencement of labor. Still, I would not say that it were useless to examine carefully all women during the latter months of gestation, in order to determine the form and obliquities of the womb, the position of the fœtus, the greater or less amount of fluid, and whatever other circumstances might affect the presentation of the child at the commencement of labor. When carefully performed, this examination will rarely lead to an immediate operation, but will often have the effect to awaken the attention of the accoucheur to difficulties which, at a later period, he may be able to correct in time.

Especially ought such an examination to be made when a faulty presentation had been discovered in preceding pregnancies, for were this found to be again the case, the woman would be advised to avoid all shocks or great fatigue, which might lead to premature rupture of the membranes. She ought to be strongly advised to observe the utmost quiet from the appearance of the first pain, and to call her physician as soon as possible.

In case of considerable anteversion, the uterus should be kept raised during the day by a broad belt around the abdomen supported by suspenders, whilst, at night, she ought to lie upon the back. When there is lateral obliquity, the decubitus should be upon the opposite side. We have nothing further to say in regard to version before labor.

B. *During Labor and before Rupture of the Membranes.* Under these circumstances is it, that version, by external manipulation, has been especially lauded by Wigand and German writers, and then only is it that it seems to us to possess incontrovertible advantages. We may readily con-

ceive, that the mobility of the fœtus at that time, immersed as it is in the amniotic fluid, ought strikingly to facilitate the movements sought to be executed; whilst, on the other hand, the possibility of rupturing the membranes as soon as the operation has succeeded, affords a sure means of avoiding a relapse.

With the exception of some special cases, of which we shall have to speak hereafter, it seems to us indispensable, as a general thing, that the membranes should remain entire. A second condition regarded by Wigand as very important, is the persistence and regularity of the uterine contractions. If too feeble, spasmodic, or irregular, they ought, before anything else is done, be stimulated in the first case, and made regular by opium or chloroform in the second. "I recollect several cases," he says, "in which the head, after having been forced down by the very violent contractions, rose again above the superior strait, until the very irregular contractions were made regular by the use of opium."

Contraindications.— Besides the irregularity of the contractions, which it is always easy to remedy, version by external manipulation is necessarily excluded by all circumstances requiring a prompt termination of the labor. Thus, hemorrhage, convulsions, syncope, rupture of the uterus, prolapsus of the cord, fœtal monstrosities, &c., are so many contraindications to the operation. The case is the same with twin pregnancies, which makes it very difficult to diagnose the presentation of both children, and in which it is not always easy to know whether the pressure is exerted upon both extremities of the same fœtus.

Positions of the Child, in which Version by External Manipulation ought to be performed.— As was stated on page 841 *et seq.*, the presentations of the vertex and pelvis are liable to certain irregularities or inclinations, which, in the great majority of cases, are corrected spontaneously when the membranes are ruptured, but which not unfrequently continue or facilitate the production of presentations more unfavorable still. In this case, the presenting part, head or pelvis, has no disposition to engage in the superior strait, but strikes against one of its borders. The longitudinal axis of the fœtus is not in the direction of the axis of the pelvis, but is more or less inclined to it. At other times, what is still more serious, it lies transversely, so as to form a trunk presentation; now, it is especially in these oblique or transverse positions of the fœtal axis, that version by external manipulation may be performed with advantage, and we shall borrow from Wigand the course to be pursued.

1. *Preliminary Measures.*— The first precaution is to make as sure as possible of the position of the child and the exact situation of the head and pelvis. Without entering into the details already given whilst treating of each presentation, we recall briefly that the accoucheur ought to make use successively of abdominal palpation, whereby he recognizes the fœtal inequalities, of the touch, performed whilst the patient is standing and whilst lying on the back, and finally, of auscultation. He will take especial note of the form of the uterine tumor, of the greater or less protrusion of the bag of waters, and of the impossibility of reaching any part of the child by the finger in the vagina.

The position the woman should take varies according to circumstances. Generally, she ought to lie upon the side in which is situated the part of the child which it is desired to bring to the opening. Thus, if this part be the head, and it rests upon the left ilium, the patient should lie on the left side. The lateral decubitus ought not to be carried too far, but just so as to direct the umbilicus slightly to the left. To give the abdomen a solid support, a thick and hard cushion, or a cloth several times folded, should be placed beneath, and against which the woman must be careful to press strongly, at the same time assisting herself with her hands. The change of position should be made between the pains, lest the displacement of the child in connection with the uterine contraction should occasion rupture of the membranes.

If the diagnosis has not been clearly made out, the patient will lie upon the left side, this being the position appropriate to the greater number of cases.

Decided anteversion, with the head resting upon the crest of the pubis, demands the dorsal decubitus, the pelvis being at the same time slightly raised, and the abdomen supported by a broad bandage in the hands of assistants.

The position of the accoucheur will be various and sufficiently indicated by the operation he is about to undertake.

Both the bladder and rectum ought, of course, to be emptied.

Mode of Operation.— In some cases of simple obliquity of the child, the mere position, aided by the cushion placed beneath the side of the abdomen, has proved sufficient to accomplish the reduction, though most frequently, especially in transverse presentations, external manipulation becomes necessary.

The accoucheur ought always to endeavor to cause that extremity of the child to descend into the strait *which is nearest the opening of the pelvis.* Breech presentations are not so unfavorable but that we may, in some cases, give up the attempt to bring the head down first, in order to avoid too long-continued and perhaps hurtful efforts.

Suppose, then, the child to be in the left cephalo-iliac position of the right shoulder. The operator, being to the right of the bed and wishing to depress the head, places his right hand upon it, and whilst endeavoring to make it descend, he, at the same time, endeavors to raise the pelvis by pressing it upward with his left. Acting thus in opposite directions with his hands, and endeavoring to preserve accordance in his motions, he makes light frictions on the two extremities of the child; if these be not successful, he will press more strongly, always acting at the same time on both extremities.

As soon as the cephalic extremity is brought to the superior strait, a few moments should be allowed to pass, in order to be certain that it is well fixed there; then the membranes ought to be ruptured, so that the contraction of the womb may keep the child in its new position.

When the head happens to be in the neighborhood of the uterine orifice, as in oblique or inclined positions of the vertex, it will suffice to press with a single hand upon the part of the abdomen corresponding with the breech.

whilst two fingers of the other hand, passed into the cervix, slide the head over the edge of the strait and rupture the membranes at the proper moment.

It is easy to understand the modifications required by the operation, when it is decided to bring the breech, instead of the head, to the superior strait.

The change once made, the delivery is left to nature, though, if difficulties should occur, the usual means will be employed for their removal.

External manipulation may be practised with any amount of dilatation of the cervix, though it were best, in general, not to rupture the membranes until the dilatation is pretty far advanced. When, at the commencement of labor, the accoucheur detects an oblique position of the head or breech, or a presentation of the trunk, he ought first merely to put the woman in a proper position, and by means of a folded cloth or hard cushion placed under the side of the abdomen, make pressure upon the part of the child which he wishes should engage. At the same time, he insists upon absolute immobility, especially during the pain, and if, after waiting five or six hours, these measures have not sufficed to change the presentation, he will have recourse to external pressure as already described. When the conversion is effected, the membranes ought to be ruptured at once, provided the dilatation of the cervix is advanced, but if otherwise, the woman should be merely kept upon her side and proper pressure maintained upon the abdomen. Sometimes, notwithstanding these measures, the child resumes its faulty position, and then the whole operation has to be repeated, and the membranes broken immediately after.

c. *During Labor and after Rupture of the Membranes.*—Under these circumstances, version by external manipulation is advisable only in oblique positions, when the head or breech are very near the cervix, the membranes broken only a short time before with a certain amount of water remaining in the uterus, and the child possessing considerable mobility. Even then, it were proper to be very careful and not continue too long attempts, whose least inconvenience would be the loss of precious time. For my own part, I would prefer, if the dilatation of the neck allowed it, to take advantage of the favorable conditions and perform the pelvic version. For a stronger reason, would I be disposed to advise the same thing to be done in transverse presentations of the trunk.

Flamand did not restrict the rule to bring down the head in trunk positions to the cases just indicated; but he was also in favor of the performance of the cephalic version, even after the rupture of the membranes and the discharge of the amniotic liquid. He has even gone so far as to point out the particular manœuvre for each one of the distinct presentations admitted by him, for the child's anterior, posterior, and lateral planes. (*Journ. Complement. des Sciences Médicales*); but we deem it useless to enter into his long details, more especially since they may all be comprised in this: to grasp the presenting part, push it up above the strait, and then carry it as far as possible towards the side opposite to where the head is found; and afterwards get hold of the head, and bring it down, if the efforts made by the other hand through the abdominal walls have not proved sufficient to make it descend into the excavation.

Flamand himself acknowledges that this operation seldom succeeds, excepting when some region of the neck or upper part of the thorax presents at the strait. For our own part, we believe it would be difficult, even under such circumstances; however, it is barely possible, especially if there is still some water in the uterus, and the contractions are not very energetic; still, under the circumstances, we should think it right to endeavor to effect the object. But where a long time has elapsed after the rupture of the membranes and the total discharge of the amniotic liquid, and the womb is strongly contracted, we do not hesitate to recommend the pelvic version in preference; and particularly so, in those cases in which some region of the lower half of the trunk presents at the centre of the strait.

In common with many of our contemporaries, we had hitherto advised cephalic version in cases of contracted pelvis, from a fear of the difficulties to which an arrest of the head above the superior strait would give rise. An interesting memoir, by Dr. Simpson, having again directed our attention to the advantages and disadvantages of pelvic version, we subjected the known facts to a careful examination, and now confess that the reading of the memoir has greatly changed our opinion. We are, at present, convinced that the dangers of pelvic version, in cases of contracted pelvis, have been much exaggerated, and do not hesitate to recommend this operation in preference to cephalic version, which would prove very difficult after a complete evacuation of the waters, and, after all, would require the forceps to be applied.

Still more strongly would we prefer pelvic version, if the pelvis were one of the kind in which the narrowing affects one side much more than the other; that is to say, one in which the sacro-vertebral angle, though projecting strongly forward, is, at the same time, turned to one side, as in the oblique-oval pelvis of M. Naegèle, for it would enable us the more easily to direct the back, and the large occipital extremity of the head toward the most roomy side of the pelvis.

When a trunk presentation is complicated by the descent of an arm, the cephalic version, recommended by Ruffius (*humeri repellendi ut caput*), Rhodion, and others, should, in my estimation, be wholly rejected; since the necessity of a previous return of the arm would then render the version by the head exceedingly difficult, if indeed, as before stated, the premature rupture of the membranes did not constrain us to abandon it altogether. Consequently, the pelvic version would appear to be far preferable in cases of this kind.

Presentations of the Pelvic Extremity. "Partisans, as we are, of the version by the head," says Flamand, "we are not prepared to propose it in these cases indiscriminately, notwithstanding we are that way inclined. But after a consideration of the following suppositions, we do not doubt that every unprejudiced accoucheur will follow our advice, and attempt this operation.

"Supposing that a monstrosity were to present without any lower extremities whatever, or one having only a couple of little stumps near the buttock, too small to furnish a sufficient hold for the accoucheur's hand to draw down the breech, and at the same time the mobility of the fœtus indicates

the possibility of bringing down the head, who would hesitate to attempt the operation?" For ourselves, we should not hesitate to leave the delivery entirely to the powers of nature; for what would be gained by drawing on the pelvic extremity? Have not the precepts of Madame Lachapelle, of Desormeaux, of Dubois, and others, taught us, that all tractions on this extremity are more hurtful than beneficial? And would not some of those disadvantages that Flamand and his followers refer to the delivery by the breech, and on which they rely for advising the cephalic version, — would not they result in consequence of such imprudent tractions?

"Supposing a woman has but three inches and three lines in her sacro-pubic diameter, and that in former labors she has lost several children that were delivered by the breech; and besides, that the fœtus appears sufficiently movable at the time when, or shortly after we are obliged to rupture the membranes — an attempt to effect the version by the head is warrantable."

We likewise believe that, in such a case, the accoucheur would be justified in making this attempt before the membranes are ruptured; but after the discharge of the waters, it appears to us that this operation must be impracticable in a large majority of cases; and we should then prefer well-conducted tractions on the trunk of the child, using every exertion to keep up the flexion of the head at the moment when the latter reaches the superior strait. The observations of Madame Lachapelle, and those published more recently by Dr. Simpson, afford a satisfactory reason for our preference, even in those cases where the pelvic contraction results from the direct forward projection of the sacro-vertebral angle; and this precept would be still more applicable, if one of those pelves described by M. Nægèle, under the name of oblique-oval, were to be met with. For the tractions then made on the breech would have the effect of turning the child's back, and, as a consequence, the large occipital extremity of the head, towards the widest part of the pelvis.

To recapitulate: Version by external manipulation ought to be attempted, in oblique or transverse positions of the body of the child, only during labor, and, if possible, before the membranes are ruptured. Should, however, but a few moments have elapsed since the rupture took place and a certain amount of water remain in the womb; if, in short, the child is still movable, and the part to be brought down very near the cervix, some attempt may yet be made with this object; but, should difficulty be met with, pelvic version must be employed instead.

If the faulty position of the child has been discovered before labor, the preventive measures already mentioned should be had recourse to, and external manipulation left until labor has begun.

ARTICLE II.

OF PELVIC VERSION.

This is an operation whereby the pelvic extremity is brought to the superior strait, from which it had been more or less removed.

As stated in the preceding article, this result may be obtained by external manipulation performed before the membranes are ruptured. We gave a

formal statement, however, of contraindications for this method, even though the membranes be intact. It frequently happens that the accoucheur is not called to the patient until long after the waters have been discharged, and then first discovers the faulty position of the child. As in all such cases, pelvic version by internal manipulation is indispensable, we shall have to study the subject with the greatest care.

In the first place will be given the general rules applicable to all cases of this operation, and afterward the peculiarities presented by each of the presentations of the vertex, face, and trunk. Before operating, it is well, however, to observe certain precautions which may facilitate the process at a later period, and especially is it necessary to bear in mind the *conditions* necessary for the performance of the operation.

§ 1. Precautions to be observed.

Before studying the general rules for the performance of pelvic version, we will point out briefly certain precautions to be observed by the operator, and which apply to all cases.

1. In the first place, the accoucheur ought to apprise the patient of the operation he is about to perform, to make her understand as clearly as possible the necessity for resorting to it, and to calm her anxiety, and to remove any fears as to the unfavorable consequences it may have either upon herself or the child.

2. As soon as the woman shall have consented to the operation, she is to be placed in a suitable position, which position varies very much in different countries, and even according to individual accoucheurs. The following is the one generally preferred in France: the woman places herself across the bed, one side of which rests against a wall or some tall piece of furniture; several pillows are then piled up under her back, so as to keep the upper part of the body moderately elevated; and that the sacrum, by resting on the free side of the bed, may leave the vulva and perineum entirely exposed. The lower extremities are moderately flexed, the feet resting on two chairs, and supported by two assistants standing on the outside of the limbs. When the patient is very intractable, or fears that she cannot control her movements, another assistant holds the pelvis in a fixed position by grasping the iliac crests.

In England, women are usually delivered on the side; and they are placed in the same position whenever it becomes necessary to resort to any operation; the precaution being taken, however, to bring the breech to the side of the bed, and to place a cushion between the knees, for the purpose of keeping them apart.

It were well worth while, in some cases at least, to adopt this position. When, for instance, the dorsal region of the fœtus is directed backward, the lateral decubitus sometimes allows the hand to reach the feet with greater facility; in the dorso-anterior position, on the contrary, turning is more easily effected whilst the patient lies upon the back.

3. As the little bed on which women are delivered is often too low, and therefore incommodious for the operator, some practitioners direct a mattress to be placed on a bureau or any other article of furniture of a proper height.

to which the patient is to be transferred. In most cases, the accoucheur will, no doubt, be obliged to go down on his knees, or sit on a low chair, which position is often inconvenient, and obstructs the operation. When the bed is too low, it should be raised by means of a folded mattress, or else the woman may be placed upon some higher piece of furniture. Generally it is only necessary to turn the bed in such a way that one of its sides will be supported against the wall, and to place the woman crosswise on it, taking the precaution, if necessary, to elevate her breech by slipping a pillow under the first mattress; this is such a simple affair that she will scarcely perceive it, and it will not disturb her in any way.

4. The accoucheur ought to throw off his coat, as the forearm has to be introduced into the parts as far up as the elbow. He will also have a proper number of napkins prepared and placed at the foot of the bed to wipe his hands, and to envelop the body of the child as it shall be extracted.

5. Before operating, he should again ascertain the child's position. We need only refer here to the diagnostic signs in each presentation, that have been pointed out in describing natural labor.

6. The position being clearly recognized, it will be necessary to decide on the choice of the hand by which the version is to be performed. In the presentations of the vertex, face, and breech, we introduce that hand which, being held midway between pronation and supination, has its palmar surface turned towards the child's anterior plane; while, in those of the trunk we introduce the hand having the same name as the presenting side of the fœtus (the right hand for the right side, and the left hand for the left one), whenever we intend to perform the pelvic version. As to the cephalic version, it is difficult to lay down any general rule for the particular hand to be used, since this varies according to the particular case.

The hand and forearm chosen are then covered by some fatty substance, with a view of facilitating their introduction, and, at the same time, of protecting them against the contagion of any diseases the woman might be affected with. Care should be taken to grease only the dorsal surface of the hand, which alone comes into contact with the mother's parts, the palmar face having to apply itself to those of the fœtus which are too slippery already.

7. In those cases in which the version is rendered indispensable by some accident that threatens the life of the mother or child, and, consequently, where it is not possible to choose our own time, we evidently have to operate as soon as the gravity of the case renders it advisable; but in those in which a malposition of the infant constitutes the whole difficulty, as in the trunk presentations, for example, the operator (if attendant on the patient from the commencement of her labor) should bear in mind that, when the bag of waters is still intact, or else so recently ruptured that a considerable quantity of water still remains in the uterine cavity, the introduction of the hand and the evolution of the fœtus are much easier than at any other time; and, consequently, he ought to select that moment for operating, provided always the os uteri is sufficiently dilated.

§ 2. Necessary Conditions.

In order to perform the pelvic version, it is requisite that the os uteri be dilated or dilatable; that the presenting part be not engaged too deeply in

the excavation, and more particularly that it has not cleared the neck of the uterus; finally, except in trunk presentations, most authors require that no disproportion exist between the size of the head and the dimensions of the pelvis.

1. It is necessary, we say, that the os uteri be sufficiently dilated or dilatable to permit the ready introduction of the hand, and the free passage of the child. The neck may be considered as being properly dilated, when its orifice offers nearly two inches in diameter; but it may be much less open, and yet the version be still possible, because it is then often sufficiently dilatable. In the latter case, the cervix is thick, soft, supple, and easily distended; it is neither tense nor contracted, and the finger, on being passed over the divers points of its circumference, finds that it does not resist in the least, and that it admits of being readily enlarged. This dilatability of the uterine orifice is particularly apt to be met with, when the presenting part cannot engage in the os uteri after the membranes are ruptured, on account of its volume or bad position; because, being no longer sustained, the margins then relapse towards its centre, and thus diminish its size.

2. The second condition is, that the presenting part be not too deeply engaged in the excavation, and more especially that it has not cleared the cervix. It will presently be seen that, before endeavoring to enter the uterus, the hand of the accoucheur ought to push the part, which is already more or less engaged in the excavation, above the superior strait. Now, it is evident that if this part had cleared the os uteri, it could not be returned without the womb being pressed back at the same time, and consequently without exposing the utero-vaginal attachments to laceration.

3. When the pelvis is contracted, most French accoucheurs proscribe pelvic version. Although we also at one time adopted this view, we now think that it should be reserved for those cases only in which the narrowing affects all the diameters of the pelvis, or in which the sacro-pubic diameter is excessively shortened. An attentive examination of this question has convinced me that Madame Lachapelle, Dr. Simpson, of Edinburgh, and Mr. Radfort, of Manchester, were right in preferring pelvic version to the application of the forceps in some cases. We shall discuss this important practical point in the following chapter, but we feel justified in saying at present that version may be practised with advantage: 1, in the oblique-oval contractions of M. Naegèle; 2, in those antero-posterior contractions of the inferior strait complicated with a considerable narrowing of the sub-pubic arch. (See *Forceps.*)

Below two inches, the antero-posterior diameter of the pelvis is so short as to render it impossible to introduce the hand. A contraction so great as this, makes it unnecessary to insist much upon attempts at version.

Lusk gives as the result of version in 40 cases of contracted pelves 31 living infants, without the sacrifice of a single mother.

§ 3. General Rules of the Operation.

The operation, in the performance of podalic version, is composed of three principal stages:

1. *Introduction of the Hand.*—The patient having been properly placed, the operator sits down or rests on one knee before her, then presents his hand

at the entrance of the vulva, and endeavors to introduce it by pressing gently from before backwards, and slightly from above downwards. If the vulva is very large, the fingers are held together and introduced, flat first, taking care to depress the anterior-perineal commissure with the cubital border of the hand; but if the vulva is very narrow, the fingers are introduced one after another, and then brought together in such a way as to form a kind of gutter, in which the thumb can slip along their palmar concavity, and thus enter imperceptibly. The hand thus forms a cone, the base of which is still at the exterior, while its apex endeavors to penetrate up into the vaginal cavity. The wrist is then slightly depressed, in order to accommodate the direction of the hand to the line of axis of the inferior strait; and, as the fingers penetrate deeper, it is depressed more and more, so as to make the hand describe a curve with its concavity anterior, corresponding to the pelvic axis. The introduction is facilitated by gently and moderately rotating the hand on its own axis, with a view of effacing the folds of the vagina.

Whenever possible, the introduction into the vulva must be made during the interval between the pains. Ant. Dubois gave a different precept, and taught that it was preferable to make the introduction while the pain lasted; for, said he, the woman, being engrossed with the uterine pain, will not perceive that caused by the entrance of the hand. But every one who has attended a female in labor, and has made the vaginal examination during the contraction, must be convinced of the error of this celebrated accoucheur.

The fingers, having reached the upper part of the vagina, may find the os uteri either freely dilated or sufficiently dilatable. In the former case they can be made to penetrate into the organ without any difficulty, by placing them between the internal surface of the uterus and the presenting part of the child; but, in the latter, they are to be introduced one after the other, in such a manner as to form a cone, the extremity of which is entered in the orifice. Then the hand is pushed along, imparting to it at the same time some gentle rotatory movements, and separating the fingers a little from each other, so as to make a moderate and uniform pressure on the various points of the periphery of the cervix. When the services of an assistant can be obtained, he should be directed to place both hands over the fundus of the uterus, in order to prevent it from being pressed up by the efforts made to introduce the hand; if there is no assistant, the other hand of the accoucheur is placed over the fundus to perform the same office. Without this precaution, there would be danger of lacerating the vagina at its point of attachment with the uterus.

The os uteri ought to be entered during the interval of the pains. As soon as the hand has reached the cervix, it is necessary to ascertain that we have not been mistaken about the position; and in case an error has been committed and the wrong hand has been introduced, it should be withdrawn at once, and replaced by the other, if there is reason to anticipate much difficulty in the version; that is to say, if the membranes have been ruptured a long time, the pains are strong, and the waters are wholly discharged; for we ought not to add to the difficulties that already exist by the choice of the wrong hand. But, under opposite circumstances we might use the hand

first introduced, so as to spare the patient the pain and repugnance which the introduction of a second one always occasions her.

When the hand arrives at the os uteri, the membranes may either be still intact, or they may have been ruptured for a long time. Supposing the former to be the case, the question arises, are they to be ruptured before passing any further? It is far better to insinuate the hand between the external surface of the membranes and the internal one of the womb, and thus get it up to the point where, from the child's position, we know the feet ought to be found; and only rupture the membranes at the moment when the lower extremities are seized, or at least not until after the whole hand has penetrated into the uterine cavity. Both processes have their advantages: the first is the most expeditious and does not, whatever may be said to the contrary, permit a too rapid discharge of the waters, for the simple reason that the presence of the forearm in the mouth of the womb stops it almost completely. In the second, by leaving the membranes unbroken until the feet are grasped, we have the great advantage of reaching the fundus uteri much more easily, of turning the feet more promptly, and of practising the second stage or evolution of the fœtus more readily, the latter being yet movable in the surrounding waters. If the hand finds the placenta attached to one side of the organ, as it advances between the internal surface of the womb and the external one of the membranes, it is very necessary to avoid its detachment, which might be done by passing around its margin; and where this is impracticable, to rupture the membrane at the inferior border of the placenta.[1]

The introduction of the hand is far more difficult when the membranes are broken, for the presence of another foreign body stimulates the contractions still more, and it were folly to endeavor to overcome them. It is therefore advisable to suspend all attempts, and only renew them when the pains are a little calmed. The first step in the process is to get hold of the presenting part, and push it up a little above the superior strait; then it is to be carried toward one of the iliac fossæ, where it is sustained, first by the palm of the hand, and afterwards by the anterior surface of the forearm. This pressing back, which is easy when the fœtus is still somewhat movable, becomes impossible when the waters are entirely discharged; in this case our efforts should be limited to gliding the hand between the neck and the presenting part. The mode of reaching the feet varies

Fig. 120.

In this figure the head has been pushed up to the left iliac fossa, and one foot gets hold of; the other supports the organ externally.

[1] This plan is recommended by Peu, Smellie, Delmeryc, Hamilton, Ricc, Naegele, and Madame Lachapelle. The latter has even been careful to suggest another precaution, namely, to rupture the membranes during the relaxation of the uterus, lest its contraction drive out a large portion of the waters.

according to the particular position. Some accoucheurs have laid it down as a general rule to pass the hand around the side of the child that is directed towards the mother's loins, and then slip it along its back and breech, and down along the posterior surface of the lower extremities to the feet. For, by following an opposite course, and laying it flat on the anterior surface of the fœtus, and thus guiding it directly to the feet, nothing would be easier than to mistake the hand for a foot, or an elbow for the knee, in the folded-up condition of the superior and inferior extremities. There are some cases in which this direction may be followed, but in many others it is useless or impossible to take this precaution: useless, when a considerable quantity of water still remains in the cavity of the uterus; and impossible, where the membranes have been ruptured for a long time, and the uterine walls are forcibly retracted on the child's trunk; for then we must be content with slipping the hand flat along the anterior plane of the fœtus, being careful not to confound a foot with a hand.

2. *Evolution of the Fœtus.*— Having succeeded in finding the feet, the hand grasps them in such a way, that the index finger is placed between the two internal malleoli, the thumb on the external surface of one leg, and the three fingers on the external side of the other. Such at least is the direction given by many medical authors, but in practice we cannot always do what we would, and it is only necessary to be certain that we have a firm hold of them. (See Fig. 120.) It is sometimes difficult to seize both feet at the same time; and we must then be satisfied with a single one, provided the search after the second is attended with considerable difficulty. The feet are then drawn upon in such a way as to double up the fœtus on its anterior plane. During the performance of this evolution, which is always to be done during the interval between the pains, the other hand should be placed over the part of the abdomen where the head is found, and by pressing up, the latter should endeavor to make it ascend towards the fundus of the womb. It sometimes happens, as just stated, that only one foot can be brought down into the vagina, and if this is the anterior or sub-pubic one, the operation might be terminated without going in search of the other; but if, on the contrary, it is the posterior foot, we should, after having secured it with a fillet,[1] introduce the hand anew, and follow the internal

Fig. 121.

The same position, in which the version is commenced by drawing down the feet.

[1] The fillet usually consists of a piece of tape, one or two fingers' breadth wide and a yard long, made into a loose slip-knot, which is applied above the ankle; when the foot is still in the vagina, the knot is placed on the dorsal surface of the hand, and then, by grasping the foot, it is slipped over it above the malleoli, and afterwards tightened by drawing on the two extremities of the tape that hang down at the vulva.

border of the limb already extracted, up to the root of the opposite leg, whence by tracing out the latter, we finally get to the other foot, which is to be brought down in a line of abduction. It is to be understood, however, that it is possible and often easy to turn when the posterior foot only can be got hold of; in which case, the course to be pursued will be pointed out hereafter.

In some cases, it is much easier to seize the knees which present to the hand of the accoucheur, and they might then be drawn upon without inconvenience for the purpose of effecting evolution, but relinquished when brought down far enough to allow him to get hold of the feet.

3. The *extraction* is the only stage of version performed during the uterine contraction. In fact, as the latter facilitates the tractions made on the pelvic extremity, and likewise serves to keep the head flexed on the chest, the accoucheur would be justified in terminating the labor, without waiting the return of the pain, only when there was a complete inertia of the womb conjoined with some accident requiring a prompt delivery.

At first, we must draw on the sub-pubic limb as much as possible, because we thereby encourage the rotation of the anterior plane of the child towards the mother's loins, and we are better enabled to press the parts backwards; that is, to get them in the direction of the axis of the superior strait, which they have to traverse. If the posterior foot is the one brought down, the version may be completed successfully with it alone. In order to accomplish it, the limb should be rotated to the right or left whilst being drawn upon; the breech, generally following the movement thus communicated, will descend with its greatest diameter corresponding to the transverse diameter of the pelvis. Continued traction in the same direction finally brings under the pubis the foot which at first was behind, and the operation is completed as under ordinary circumstances.

As the lower extremities are delivered, the whole extent of the disengaged parts are grasped by the two hands, taking care to place the thumbs on the posterior part of the limbs, the index and medius on their external surface, and the ring and the little fingers on their anterior surface. When the breech appears at the vulva, it is necessary to ascertain the state of the cord; for that purpose, a finger is to be slipped up to its umbilical insertion, when, if it be found tense, the thumb is joined to the finger, and by making a gentle traction on its placental extremity, by both, the loop it forms will be enlarged (Fig. 123). If the cord has slipped over one leg, and got into the fissure between the thighs, it will likewise be necessary, after having drawn slightly on it, to disengage the child's posterior limb, and place the cord in contact with the perineum.

In case the version has been demanded by an unfavorable position, and

When the foot is high up in the vagina, it is often very difficult to apply the fillet: in this case, M. Van Huevel proposes substituting for it a long forceps, the upper extremity of whose branches terminate in a half ring placed at right angles upon the stem. When the forceps are closed, we have a complete ring, by means of which the leg is seized above the malleoli. But why should instruments be so constructed without absolute necessity?

the child has been restored to a natural one by the pelvic evolution, the rest of the travail is left to nature; provided always the force and frequency of

Fig. 122.

The version is here completed, and the occiput, which was placed in the left iliac fossa, at the commencement of the operation, will now come down behind the right acetabulum.

Fig. 123.

Management of the cord.

the pains are such as to give us reason to anticipate a speedy delivery. But if the uterine contractions are feeble or slow, or if the severity of the symptoms endanger the life of either the mother or the child, the tractions must be kept up, and the patient be encouraged to aid them with all her remaining strength. The hips, loins, and lower part of the chest soon come down; and as this delivery progresses, the accoucheur's hands ought to embrace as many parts as possible, constantly seizing those that are nearest to the vulva, and taking care always to act on the bones, not on the soft parts. The arms are apt to become stretched out along the sides of the head, and thus descend with it into the excavation; when their disengagement must be effected in the following manner: we commence with the posterior one, which has only the resistance of the soft parts of the perineum to overcome, and therefore will offer less difficulty than the sub-pubic arm. The same hand is again used by placing its index and middle fingers on the posterior and external side of the arm, just beyond the humero-cubital articulation, while the thumb rests on the anterior internal plane of the humerus, where it acts like a splint; the axillary space is thus found lying in the interval that separates the thumb from the two fingers (Fig. 124). The trunk having been enveloped in a napkin is next carried up in front of the pubic symphysis, either by the other hand, or by an assistant. Then the fore and middle fingers, acting over the whole extent of the arm and a part of the forearm, bend the latter down over the side of the head and face towards

the chest, on the side of which it is ultimately placed after its complete disengagement. The sub-pubic arm is next delivered by supporting the child's trunk upon the other forearm, and depressing it towards the anus, while the hand, not the one engaged in the previous operation, is introduced in a state of forced pronation; that is, turned over on its radial border in such a way that the thumb can be still applied on the internal, and the index and middle fingers on the posterior surface of the arm; and then this is brought down over the side of the head, face, and front of the chest, as was the posterior arm.

Fig. 124.

Delivery of the posterior arm.

In ordinary cases, the head descends flexed into the excavation, the occiput being turned towards some point adjacent to the symphysis pubis, and the disengagement is effected spontaneously if the pains are tolerably strong and frequent; and if necessary to facilitate it, we have only to carry the trunk up in front of the symphysis. But should it happen that the expulsion of the head is somewhat delayed, we must aid it by introducing two fingers on the sides of the nose, and two others on the occiput, and then, by means of the latter, the operator pushes up the occiput, while he draws down, on the contrary, with those implanted on each side of the nose, and thus determines a movement of flexion which secures the delivery of the head. The difficulty would be much greater if the face was turned forward, and the occiput backward; though even here, if the head is not very voluminous, and the pelvis is large, we might effect its delivery by depressing the trunk on the perineum, and by drawing down the face in the pubic arch, with the fingers planted on the sides of the nose, so as to flex the head; or, on the other hand, by carrying the trunk up in front of the pubis, we might, in some exceptional cases, succeed in delivering the occiput first at the anterior perineal commissure. (See *Mechanism of Labor in Breech Presentations.*)

§ 4. Of the Difficulties that may be met with in performing the Pelvic Version.

In common simple cases, the manœuvre is accomplished in the way we have just described; but it frequently happens that the operator encounters difficulties in its performance, dependent either on the mother or on the child, which next claim our attention. Those which the mother's organs may present are, a very small vulva, obstinate resistance of the uterine orifice, spasmodic contraction, and mobility of the body of the womb, and insertion of the placenta over the os uteri. Those appertaining to the fœtus are, shortness of the umbilical cord, unusual size of the shoulders, crossing of the arms behind the neck, and extension of the head.

A. *Smallness of the Vulva.* Unless the smallness of the vulva results from the persistence of old adhesions, it is seldom so great, even in first

pregnancies, as to constitute a serious obstacle to the introduction of the hand. The only precaution to be taken is to pass in the fingers one after the other, and to make the hand enter gently and carefully.

B. *Resistance of the Uterine Orifice.*—The causes and principal indications of the resistances which the uterine orifice may offer to the spontaneous expulsion of the child, have already been studied (page 698, *et seq.*); and it is possible that these same difficulties may be met with in the performance of the version. Here, also, the retraction may be seated at the external or internal orifice of the neck. Two conditions may be met with when the external is the only one affected; that is, the pelvic evolution may be necessitated, either by a trunk presentation, or else by some accident which, by compromising the life of the mother or child, renders a prompt termination of the labor imperative. In the former case, whatever be the cause of the contraction, or of the non-dilatation of the orifice, all the means calculated to facilitate the dilatation will be brought into use; such as venesection if the patient is plethoric, tepid bathings, fumigations, and unctions with the extract of belladonna on the periphery of the cervix; and, where these remedies have been employed without success, we should act as in the following case. In the latter case, the necessity of terminating the labor promptly does not permit us to rely on the employment of the means just enumerated, because their action is not developed for some time; and our only resources are in a forced introduction of the hand, or multiple incisions on the neck. We have hitherto stated that, as a general rule, the repeated incisions of the cervix appear decidedly preferable to a forcible introduction of the hand, which latter is always a slow, difficult, and very painful operation, whilst the instrument is not even felt by the patient; besides, it is not dangerous, and its results can be more certainly relied on. It is, however, very necessary to take in consideration the nature of the accident which, in this state of the cervix, demands the intervention of art; for, in this respect, hemorrhage or eclampsia may present very different indications. In the former, it is very probable that the contraction of the orifice is slight, and capable of being overcome without much difficulty; besides, should it fail, the attempts at forcible introduction would have the effect to irritate the organ and excite the contraction of the fibres of the fundus, whose inertia had probably caused the flooding which demands the termination of the labor. But, during an attack of eclampsia, there is every reason for supposing that the contraction of the orifice is due to the convulsions, with which every muscle of the body is affected. Hence, it is not of a character to yield readily to attempts at introduction, and, in case of insuccess, it may be feared lest, by irritating the very sensitive fibres of the neck, they might have the effect to increase the general convulsions which we wish to remedy. Therefore, we should, in this case, give preference to incisions.

When the spasmodic contraction is confined exclusively to that portion of the uterine walls which constitutes the internal orifice in the non-gravid state, the hand, after having penetrated the external one without difficulty, is suddenly arrested by an obstacle that it cannot surmount. This retraction is apt to take place, in the presentations of the cephalic extremity, around the child's neck after the head is free, but it is oftener observed in trunk

presentations. The measures that we shall presently point out for combating the spasmodic contraction of the body of the womb, are equally applicable in cases of this kind.

c. *Insertion of the Placenta on the Neck of the Uterus.*—As is well known, this circumstance is an habitual cause of hemorrhage, and often requires the pelvic version. When the placenta is only attached by one margin to some point of the uterine neck, the hand is introduced at the part which is not covered, and the version presents nothing peculiar. But a different course has been advised relatively to the introduction of the hand, where the insertion takes place, centre for centre, and no portion of the circumference of the placenta is detached. Thus, it has been recommended to perforate the centre of the after-birth, and introduce the hand through this opening; but this appears to us a difficult and dangerous process, because: 1st, a great number of umbilical ramifications are then necessarily torn, and a hemorrhage produced which may speedily prove fatal to the child; 2d, the force necessary to effect this perforation is sometimes sufficient to drag upon, and then detach, the periphery of the still adherent placenta; and, 3d, the central opening made in the after-birth will seldom be spacious enough to permit the child's trunk and head to pass freely; whence it may happen that the frictions made by the movable parts of the fœtus against the margins of this opening, will facilitate a displacement of the arms and an extension of the head. Consequently, unless the patient's strength be already exhausted by the flooding, or the placental adhesions be very strong, we would rather detach some point of the circumference of the placenta, and thus get the hand between its external face and the internal wall of the uterus. True, by operating in this manner, we should lacerate a certain number of utero-placental vessels, and thereby add to the sources of hemorrhage, but we would succeed in saving the child's blood; besides which, the hand and forearm, at first, and then a little later the trunk of the fœtus, by becoming applied over the mouths of these vessels, would compress them like a tampon, and thus put an end to the hemorrhage.

d. *Violent Contraction of the Body of the Womb.*—This is a condition that always makes the version very painful and very difficult, and, in certain cases, may even render it impossible; it is, therefore, a sufficient reason for preferring an application of the forceps when the cephalic extremity presents. But, in a case of trunk presentation, version would be the only practicable measure; and even that might be rendered wholly impossible by the retraction of the uterus. I have succeeded very well in such cases by introducing the hands one after the other several times, and using gentle efforts to pass them deeply into the uterus. The muscular fibre of the organ being thus fatigued, sometimes relaxes, and allows the feet to be reached. Here, likewise, venesection and tepid bathing prove very useful; and the employment of opiates is particularly indicated, for the aqueous extract of opium, when administered in injections, or by the stomach, in the dose of three-quarters of a grain to two grains, or an equivalent quantity of laudanum, is usually found sufficient to overcome the resistance of the body of the womb. Under such circumstances, Dewees highly extols a resort to general bleeding, carried to syncope; and he makes the patient sians up

during the operation, whenever possible, so as to produce this effect more speedily.

I had an opportunity of putting the advice of the American accoucheur into practice, for the first time, on a lady in the Rue du Four-Saint-Germain, to whom I was called in consultation by Dr. Trèves. The child presented by the left shoulder; notwithstanding which, ergot had been administered, in consequence of an error of diagnosis, and the uterus was so contracted on the trunk of the child that an introduction of the hand was altogether impossible. I made the patient get up, and had her supported by two assistants; the vein was opened, and I permitted the blood to run until the woman fainted; when she was immediately replaced on her bed, and the version was effected without difficulty.

If these measures fail, and the child be still living, there is evidently no other resource than to wait and hope for a spontaneous evolution from the expulsory efforts of the uterus. If it be dead, the section of its neck, according to the plan of Celsus, and a separate extraction of the trunk, and afterwards of the head, ought to be immediately practised, with a view of sparing the patient the disastrous consequences of a prolonged and usually a uselessly prolonged labor. (See *Embryotomy.*)

Again, the contraction of the uterus very frequently renders the efforts made during the version to turn the anterior plane of the fœtus backwards ineffectual; and where this is the case, it is not advisable to operate on the trunk, by pushing it back and drawing it down alternately, endeavoring to impress a slight rotation on it each time, as certain accoucheurs have recommended; for that would very often be impossible, and, besides, by being carried too far, it would wring the child's neck; for the head, being held by the contraction of the fundus uteri, might not participate in the rotation impressed on the trunk. It is much better, therefore, to renounce it altogether and permit the face to come above.

Inhalations of chloroform have been recommended by some persons as possessing the immense advantage of quieting these spasmodic contractions of the uterus, and of rendering versions easy, which were previously impossible. I have no personal experience in this matter, but upon interrogating that of others, I find that they have obtained very different results. Thus, whilst M. Stoltz thought that he had remarked an increase in the frequency and force of the contractions, and Mr. Murphy states that he had never before met with so much difficulty in a case of turning, although the patient *was completely under the influence of the chloroform*, we find Dr. Denham affirming that in ten cases in which chloroform had been administered previous to the version, its use had facilitated the operation, and that its happy influence was especially remarked in the case of a woman in whom the introduction of the hand, though attempted fruitlessly before the inhalation, was effected with the greatest ease immediately afterward.

The facts as yet known are too contradictory to enable us to judge of the efficacy of chloroform in these cases. For even in those in which its use was followed by a relaxation of the uterus, is it certain that this occurrence, which often takes place spontaneously and suddenly, was anything more

than a simple coincidence? There seems some reason for thinking so, when we recollect the cases in which it produced no effect. It is, therefore, an undecided question. However, I should hasten to add, that Mr. Simpson, and other most conscientious men, admit that the inhalation of chloroform must be pushed to its fullest extent, and be continued for a long time, before it affects the muscles of organic life. Mr. Simpson attributes the suspension of normal labor to the abuse and excess of inhalation. If such be the case, is it not reasonable to suppose that it would be necessary to carry the use of chloroform beyond the limits of prudence, in order to terminate the abnormal and almost tetanic contractions, and then is there not cause to fear the occurrence of one of those terrible misfortunes which some surgeons have had to deplore?

E. *Mobility of the Body of the Uterus.*—According to M. P. Dubois, sufficient stress has not been laid upon this difficulty; because, if unattended to, it may absolutely prevent the introduction of the hand as far as the fundus uteri. That is, the hand, being wedged in between the uterine and fœtal surfaces, attempts in vain to get at the feet, since the womb, the hand, and the trunk of the child then form a whole which turns on itself, but the hand does not progress into the interior of the uterine cavity. To remedy this obstacle, it is only necessary to have the fundus of the organ kept steady, by directing an assistant to place both hands over its superior and lateral parts.

F. *Shortness of the Cord.*—Whatever be the cause, the cord when very short may become stretched, during the tractions on the pelvic extremity, and even to such an extent as to occasion its rupture. This accident is to be prevented by cutting the cord, when the tractions made on its placental portion are not sufficient to relax it.

G. *Large Shoulders.*—As the loins become free at the vulva, the shoulders engage at the superior strait; when it happens, in certain cases, that the tractions, which up to that time had been efficacious, cease to be so any longer, and some resistance is experienced in completing the delivery. This resistance is dependent solely on the fact that the bis-acromial diameter of the shoulders corresponds to the diameter of the superior strait; and consequently, from its width, encounters some difficulty in clearing the latter. But this is easily relieved by imparting some oblique movements to the portions of the child already disengaged, which carry the breech successively towards the groin of one side, and the sacro-sciatic ligament of the opposite side; whereby the bis acromial diameter is inclined, and its two extremities are made to engage in the excavation one after the other.

H. *Crossing of the Arms behind the Neck.*—It sometimes happens that one of the arms ordinarily the sub pubic one) is found crossed behind the neck, when about to be delivered. We have advised that an attempt be made to bring the child's posterior plane around in front; but in order to accomplish this, it is necessary to make the trunk undergo a considerable revolution, during which the arms, that are not involved in the movement, might be displaced by rubbing against the womb, and thus become crossed between the neck and the posterior face of the symphysis pubis. It is highly im-

portant to bear in mind that, according to the observation of Dugès, this crossing of the arms may take place in two ways: namely, they may be crossed behind the neck, after having been first raised up on the sides of the head, and then the overlapping is effected from above downwards and from before backwards, relatively to the fœtus; or it may occur from below upwards, the arms then mounting up along the child's posterior plane, and becoming placed under the occiput. This latter circumstance may be produced in the following way: as the arms are usually located on the sides of the thorax, they may not participate in the movement of rotation impressed on the trunk, in making an attempt to bring the anterior plane of the fœtus towards the mother's loins; and, consequently, one or both of them may thenceforth be found placed on the child's dorsal plane. Then, supposing the tractions on the breech are continued, the arm will become arrested against the symphysis pubis, while the trunk descends or is extracted, in such a way as to be still there when the back of the neck reaches that point. These two cases can be distinguished from each other by remarking that, when the crossing of the arms has taken place from above downwards, and from before backwards, the inferior angle of the scapula is removed to a considerable distance from the median line of the spine; while, on the contrary, it will be quite close to it when the crossing has occurred from below upward along the back of the fœtus. The diagnosis is important, since the disengagement of the crossed arms evidently cannot be effected in the same manner in both cases; because, as a general rule, the arm has to be brought down in an opposite direction to the course it followed in becoming displaced. Thus, in the latter case, it must be made to descend along the back, by hooking the elbow with one or two fingers; in the former, it will be first brought over the occiput, and then down along the side of the head, face, and sternum. This latter disengagement is sometimes exceedingly difficult, for the occiput, being strongly pressed against the symphysis, seldom leaves free space enough between it and the os pubis for the operation. When this occurs, it has been recommended to press up the chest forcibly, with a view of making the occiput go upwards, and thereby releasing the arm. It would certainly be better, after having disengaged the posterior arm, to impress a movement of rotation on the whole trunk and head of the fœtus, on its longitudinal axis, which would carry the occiput and the arm to be disengaged into the hollow of the sacrum.

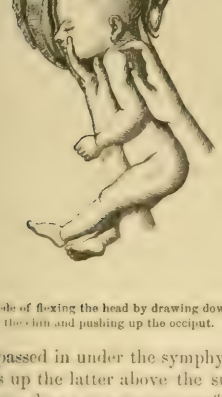
1. *Arrest of the Head.*—Both contraction of the pelvis and extension of the head may render difficult the delivery of the cephalic extremity. But as we have already pointed out what is proper to be done in the former case, we need not revert thereto again.

When the expulsion of the fœtus is left to the powers of nature, the head descends, moderately flexed, into the excavation, and most generally its disengagement presents no marked difficulty. But when it becomes extended in consequence of improper tractions on the breech, its long diameters are brought into correspondence with the diameters of the pelvis, and its further delivery is thereby rendered impossible. Of course, in this state of extension, the occiput may either be found in front, (though this seldom happens,)

or it may be found behind, the face being above, which is by far the most common.[1]

When the occiput is in front, the flexion of the head is effected without trouble; for it is generally sufficient to place two fingers on the sides of the nose, or else on the lower jaw inside of the mouth, and then depress the chin by a moderate traction on this part; whilst two fingers of the other hand

Fig. 125.



Mode of flexing the head by drawing down the chin and pushing up the occiput.

Fig. 126.

Mode of rotating the face into the hollow of the sacrum.

are passed in under the symphysis and implanted on the occiput, so as to press up the latter above the superior strait. (Fig. 125.) When this manœuvre does not prove successful, it has been recommended, before having recourse to the forceps, to introduce the hand into the hollow of the sacrum and grasp the face with its palmar concavity, in order to bring down the head into its normal position by effecting a forced flexion.

When the occiput is behind, and its delivery is not possible, either by flexion or extension, (see Fig. 126,) it is advisable, says Madame Lachapelle, to change the position of the head and carry the face back into the hollow of the sacrum; and, for that purpose, to introduce that hand into the sacral concavity whose palm would embrace the occiput more easily; the right, when the face is a little to the right, at the same time that it is in

[1] The extension of the head, during version, is far more common in those cases where the occiput is turned towards the sacrum. The reason of which will be readily understood by giving attention to the following circumstances, namely: the fractions are naturally made downwards and forwards, while the uterus, which has a constant tendency to retract, is directed somewhat downwards and backwards; whence it results that the anterior lip of the womb presses strongly on that portion of the child which is turned towards the pubis. Consequently, when the occiput is in front, the resistance offered by this lip has a tendency to flex the head still more; but, on the contrary, when it is behind, the chin is almost inevitably caught by the anterior lip, and the head is thereby extended.

front; the left, when it is somewhat to the left; though, if the face were entirely above the pubic symphysis, the choice of the hand would be a matter of indifference;) then the fingers, after having passed behind the head, are slipped over one side of it, and pushed forward as far as the mouth, by gliding along the nearest cheek (Fig. 126). The hand is then forcibly inclined on its cubital border, having the palmar surface in front; next, it draws the parts on which the extremity of the fingers is applied, that is to say, the face, downwards and backwards towards the coccyx, when nothing further remains than to flex the head and extract it as in ordinary cases.

Supra-pubic pressure combined with tractions has been recommended by many writers. Dr. Taylor's method in difficult cases, as quoted by Lusk, is to draw the body directly backward, while the head is forced by supra-pubic pressure downward and backward into the pelvis. As the head begins to advance, he raises the body of the child, and directs pressure upon the head to be made downward and forward in the axis of the outlet. Dr. Goodell, after first drawing in the direction of the outlet, the assistant pushing downward and backward, reverses the direction, and sweeps the child's body backward upon the coccyx, the neck likewise being forced downward and backward into the hollow of the sacrum with all one's power (Lusk, page 472).

§ 5. Appreciation of Version.

Version, when performed under favorable circumstances, that is to say, when the membranes are intact, or have been ruptured within a short time, and the child, surrounded by a considerable amount of fluid, still possesses a certain mobility, is, in general, an easy operation, and but slightly hazardous either to the mother or the fœtus. Unhappily, it must be confessed that these fortunate conditions are rarely met with in cases wherein we are obliged to perform the operation.

With the exception of shoulder presentations, none of the malpositions of the child require the intervention of art, until, after waiting for a longer or shorter time subsequent to the rupture of the membranes and the complete dilatation of the cervix, it is ascertained that the natural efforts are insufficient.

Shoulder presentations themselves are rarely detected certainly before or very shortly after the rupture of the membranes, so that unless an experienced accoucheur should have attended the woman from the commencement of the labor, he is not called in consultation until after the waters have been discharged for a long time. It is, therefore, mostly necessary to act under unfavorable circumstances. Now, it should not be forgotten that the requisite manœuvres, which are serious as regards the maternal organs, are especially fatal to the child. Whilst pelvic version proves fatal to one woman out of 10·4 according to Riecke, and to one out of 11·4 according to Hüter, the mortality of the children is very much greater. Thus, the statistics of Madame Lachapelle represent the loss of one child out of 3·96. Churchill, who states 542 cases of version, gives a mortality of 1 in 3 for the children, and 1 in 15 for the mothers. It is true, that he makes no distinction between the difficult cases and others.

The above-mentioned difficulties, which, unfortunately, are very common, explain sufficiently this result. With experience, and especially with great care, it is always possible to overcome them, and, at the same time, spare

the mother the grave lesions of the vagina and of the body and neck of the uterus which an unpractised and brutal hand often occasions; but we cannot always prevent the violently contracted organ from being exceedingly irritated by the forcible introduction of the hand, nor the irritation from becoming the starting-point of puerperal inflammations, nor the physical and moral shock to the patient from being so great as to terminate her existence.

It is only necessary to have followed the manœuvre in difficult cases to understand the dangers to which the fœtus is exposed. Throughout the operation, the umbilical cord is liable to be compressed more or less severely, and the efforts required to disengage the upper and lower extremities, expose them greatly to fracture. Finally, the tractions exerted upon the pelvic extremity, whenever an obstacle prevents a ready engagement of the head, may very easily give rise to lesions of the upper part of the neck and the medulla oblongata incompatible with the regular establishment of extra-uterine respiration.

It is very difficult, from an examination of the published statistics, to form an exact idea of the frequency of the cases in which version may be required. These cases, in fact, are not the same in all countries, nor for every accoucheur in the same country. Besides, as the statistics were for the most part collected in hospitals, it is evident that we would have a very incorrect proportion by deciding upon a mean from the figure of the versions performed in any one institution, because this figure represents not only the versions required by the patients already admitted into the establishment, but also the difficult cases brought there at the last moment from the city.

The following *resumé*, to which, however, I attach but a very secondary importance, will at least serve to show the differences in the statistics according to localities. Thus, whilst in England but 145 cases of version are mentioned for 39,539 deliveries, or 1 in 269, the French practice gives 400 versions for 37,479, or 1 in 93½, and the Germans have performed it 337 times in 21,516, that is to say, in one case in 63⅔.

§ 6. Of Version in Vertex, Face, Breech, and Trunk Presentations.

After the minute detail into which we have just entered in describing the general precepts that are applicable to all cases of version, it will only be necessary to point out the peculiarities attending this operation in each of the ten positions admitted by us.

Presentation of the Vertex. — Whenever the vertex presents, the child will be placed in such a way that its occiput is directed either towards one of the points on the right lateral half, or towards one on the left lateral half of the pelvis; that is, either in the left or the right occipito-iliac position.

1. *Left Occipito-Iliac Position.* — In conformity with the precepts above given, we would here introduce the left hand; which, after having reached the os uteri, is to grasp the head in such a manner that the palmar face of the four fingers shall be applied on its posterior (left) side, and the thumb on its anterior one, the sinciput being lodged in the palmar concavity. Then, during the interval between the pains, the head must be pressed up

towards the left iliac fossa; after which, the thumb is brought alongside of the index, and the hand is passed successively along the left side of the head and neck, and behind the shoulder and elbow; in a word, it is made to traverse the whole left lateral plane of the fœtus down to the breech. While this movement is being effected, it is advisable to keep the head in the iliac fossa where it was originally placed, by constantly pushing it up first with the thenar eminence of the hand, and afterwards with the front surface of the forearm. Having gained the nates, the hand, which up to that time had been kept in a state bordering on supination, is changed into one of pronation, in order to pass around the breech; when it descends on the posterior aspect of the lower extremities, extends the legs, and reaches the feet, which it seizes as firmly as possible. Or, as stated above, we might guide the hand along the anterior plane of the fœtus, and thus get directly at the feet. (Fig. 120.)

In drawing down the feet, we must be careful to curve the child's trunk in the line of its natural flexure; whilst the other hand, placed over the left iliac fossa, pushes the head towards the fundus uteri, and thus facilitates the evolution of the fœtus. This evolution being once effected, the left occipito-iliac position is found to be converted into a right lumbo-iliac one. The subsequent progress of the delivery offers no special indication.

2. *Right Occipito-Iliac Position.*—In this case, the right hand would be chosen in preference, by which the head is to be grasped, as in the preceding case, and then to be pushed up towards the right iliac fossa; the hand traverses the right lateral or posterior plane of the fœtus, and after having seized the feet converts the second position of the vertex into a first of the breech, or, in other words, into a left lumbo-iliac one.

The rapidity with which the extraction is to be effected must depend upon the gravity of the accident which has rendered it necessary.

Presentations of the Face.—In the face presentations, we use the left hand in the right mento-iliac, and the right one in the left mento-iliac positions. The four fingers are to be applied on the posterior cheek, the thumb on the anterior one, and the face will be lodged in the palmar concavity; the head, after having been pushed above the superior strait, will be carried if possible towards the left iliac fossa in the right mento-iliac, and towards the right iliac fossa in the left mento-iliac positions; and then the evolution will convert the former of these positions into a right lumbo-iliac, and the latter into a left lumbo-iliac position.

Presentations of the Pelvic Extremity.—When the pelvic extremity presents, and any circumstance whatever demands a prompt termination of the labor, it is not, properly speaking, a version that the accoucheur has to practise, but rather a few simple tractions on the presenting part.

If the feet or the knees offer at the uterine orifice, or hang in the vagina, the accoucheur merely seizes and draws on them, conforming to the rules above given; but where the lower extremities are stretched out along the child's anterior plane, and the breech alone presents, the course to be pursued varies a little, according as this part is more or less engaged in the excavation. Thus, when the nates are still above the superior strait, or at

least are so little engaged that it is easy to press them up, we must act in the following manner: taking care to introduce the left hand in the left lumbo-iliac positions, and the right hand in the opposite ones, the buttocks are first seized by the whole hand, and gently pushed up into that iliac fossa towards which the child's back is turned; then the feet are sought out, by following the posterior aspect of the lower extremities, and they are brought down so as to draw upon them and terminate the third stage of the version. When the nates have reached the pelvic floor, the index finger of one hand is placed in the posterior groin, and the same finger of the other hand in the anterior one, and then, having both fingers curved like a hook, we draw on the buttocks until the feet are entirely clear. Lastly, if the breech is so far engaged as to be no longer capable of being pressed above the superior strait, and, nevertheless, has not yet descended low enough to be caught by the fingers, a blunt hook is employed, which is to be applied from without inwards on the anterior groin, if it is possible to make it slip up between the anterior hip and the symphysis pubis (Fig. 127); in the contrary case, it is passed between the two thighs, and made to penetrate from within outwards on the internal part of the limb; but in this latter case it is necessary to protect the genital parts, the scrotum in particular, by one or more fingers previously introduced, lest they become embraced by the concavity of the instrument. (See also *Forceps.*)

Fig 127.

Mode of using the blunt hook in breech positions.

Presentations of the Trunk.—We have frequently repeated that the trunk presentations, of themselves, require the intervention of art; and that it is requisite to change the position of the child as soon as the conditions necessary to this evolution are met with. In the preceding article we endeavored to point out those conditions under which we think an attempt to effect the cephalic version ought to be recommended; notwithstanding which, the pelvic version is very often practised, either because such attempts have proved ineffectual or because it is deemed advisable not to resort to them.

Nevertheless, before laying down the rules of the operation, we must remark that the accoucheur only resorts to pelvic version in these cases in order to remedy the defective presentation; and consequently that, as soon as he shall have converted this latter into one of the breech, he should abandon the rest of the labor to the expulsory efforts of the uterus, unless some accident, serious enough to threaten the life of either the mother or the child, should require a more rapid delivery. As before stated, the trunk presentations are two in number, and each side of the fœtus may present at the superior strait in two different positions: in the first of each,

the head is in the left iliac fossa, and in the second it is in the right iliac fossa.

The rule heretofore followed in the choice of the hand is not applicable to the trunk presentations; for here we would introduce the right hand in the positions of the right lateral plane, and the left in the positions of the left lateral plane; after which the operation is conducted in the following manner:

A. *First Position of the Right Shoulder* (left cephalo-iliac).—The right hand is to be introduced into the parts in a state of supination, when, after having endeavored to push the shoulder above the superior strait, and a little towards the left iliac fossa, it is directed towards the right sacro-iliac symphysis, above which the child's feet are found; the latter will then be seized and brought down into the vagina. In doing this, it is not necessary to bend the fœtus in the line of its natural flexure, as in the vertex and face positions, but we may draw immediately on the feet and bring them into the excavation; for this lateral evolution, or bending on the side, is much more speedily accomplished, and is not attended with any inconvenience. The feet being once in the vagina, the operation is terminated as in all other cases.

B. *Second Position of the Right Shoulder* (right cephalo-iliac).—Here, likewise, the right hand is introduced in a state of supination. The shoulder is seized and pushed up towards the right iliac fossa, and then the hand traverses the posterior plane of the fœtus, by passing backwards and to the left; when it reaches the nates, it gets around them by being changed into a

Fig. 128.

The introduction of the hand in the second position of the right shoulder.

Fig. 129.

Mode of seizing the feet in the same position.

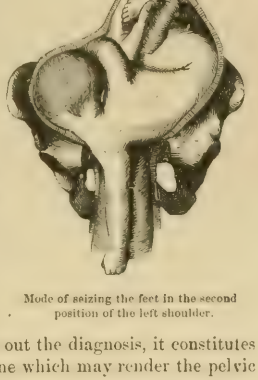
state of pronation, and then comes forward and to the left to grasp the feet, which are next brought down into the vagina. (Fig. 129).

C. *First Position of the Left Shoulder* (left cephalo-iliac).—The left hand is introduced in a state of supination, and then, after pressing the shoulder upwards and a little to the left, it is directed along the child's back towards the right posterior part of the pelvis, where it is passed around the breech

by turning to a state of pronation, and is next brought forward and to the right, so as to seize the feet.

D. *Second Position of the Left Shoulder* (right cephalo-iliac.)—The left hand, introduced in a state of supination. pushes the shoulder above the superior strait and somewhat to the right; and then, passing towards the left side and posterior part of the uterus, it goes in search of the feet, which are found there.[1]

FIG. 130.



Mode of seizing the feet in the second position of the left shoulder.

Trunk Presentations with a Descent of the Arm. (Presentations of the arm or hand, of authors.)—We have heretofore stated that the descent of the hand in the shoulder presentations is nothing more than an attendant circumstance of these latter. Consequently, whether the hand has been carried along by the gush of waters which escaped when the membranes were ruptured, or whether it has been drawn down by the accoucheur himself, in order to make out the diagnosis, it constitutes an obstacle of minor importance, and even one which may render the pelvic version more easy; hence, so far from attempting to push back the arm into the uterus, we ought to apply a fillet on the wrist, not for the purpose of drawing upon the latter, but to prevent it from returning whilst searching after the feet in the ordinary way.

[1] As the reader will see, this operation is very simple; though it must be acknowledged, however, that, in those cases in which the dorsal plane of the fœtus is directed forwards, it renders this plane liable to be turned backwards after the evolution of the child. Consequently, when we cannot succeed in turning the belly posteriorly during the traction, it gives rise to all the inconveniences hitherto pointed out as occurring in those instances in which the face looks toward the pubis.

In order to remedy these difficulties and their attendant dangers, M. Velpeau recommends that the positions in which the back is in front (the first of the right shoulder, and the second of the left) be converted into the dorso-posterior positions before attempting the evolution. Thus, he would endeavor to convert a second position of the left shoulder into a first of the left, by making the head pass above the pubis or above the promontory of the sacrum, according to whether it was originally placed nearer to the anterior arch of the pelvis, or to the right sacro-iliac symphysis; he would then terminate it, as if it had primitively been a first position of the left shoulder. "Should the membranes have been long ruptured," adds M. Velpeau, "the womb strongly contracted, and the child not to be moved but with very great difficulty, there is a third manœuvre that ought then to be preferred; it consists in pushing the shoulder up with the right hand from behind forwards, as if to make the spine turn upon its own axis; then trying to reach the right side by passing along the front of the chest, while the womb is forcibly pushed backwards with the left hand; lastly, in taking hold of the feet, the right one first, so as to bring them down in the first position." *Velpeau, Demonstrations*, p. 11.

We have alluded to this manœuvre, only, because the author's name might give it some importance in the eyes of young practitioners. But in our estimation it ought to be rejected altogether. In fact, one of two things must then happen: [illegible]

"Our object in applying this fillet," says Madame Lachapelle, "is to keep the hand at the exterior, lest the arm should take a wrong direction; as also lest, being stretched out as it is, it will not follow the rotation that turns the sternum of the fœtus posteriorly, when, by being arrested by the pubis, and by ascending along the child's back, it might become crossed behind the neck." Finally, let us add, that the hand, or rather the arm, materially aids in accomplishing the rotation of the trunk, since it offers an additional hold for the tractions made on the body, and obviates the necessity of delivering one shoulder, which is very often painful.

After what has just been said, the reader will doubtless be astonished in looking over the older writers, to observe the alarm occasioned by the so-called presentation *of the hand* or *arm*, and he will be still more surprised at the barbarous procedures employed by them for its management. They were evidently mistaken with regard to the cause of the difficulties that are often met with in the performance of version under such circumstances. However, it must be acknowledged that, although a *presentation of the hand* is nothing more than a variety of the shoulder presentation, yet the descent of the forearm, and more especially of the arm, beyond the vulva, constitutes an exceedingly unfavorable complication. Because, where this hangs down at the exterior, or nearly so, it must necessarily happen that the presenting shoulder is already forcibly engaged in the excavation; an engagement that can only take place when the whole of the waters have been discharged for some time, when the uterine contractions have been exerted for a long while on the body of the child, and when the walls of the womb have become firmly retracted on the surface of the fœtus. Moreover, the prolonged contact of the fœtal inequalities is then very apt to bring on spasmodic or tetanic contractions of the body and the neck of the uterus, which are justly considered as constituting one of the most serious complications; for they equally prevent the return of the presenting part, the introduction of the hand, and the evolution of the fœtus.

Consequently, we are not to operate on the part that may present in these difficult cases; for a return of the arm into the uterine cavity is then impossible, and of little service; to draw on it strongly, under a hope of engaging the doubled-up trunk in the excavation, and of making it perform a kind of artificial evolution, is to commence a manœuvre that cannot be carried through, and which must greatly augment the existing difficulties; to go in search of the other arm, so as to subsequently pull upon it with a view of making the descended shoulder return, presupposes an introduction

the uterus is forcibly retracted (when this conversion, if persisted in, appears to us impracticable and dangerous), or else the womb is inert, and it would therefore be useless. As we have already stated, the reason for dreading a persistence of the child's anterior plane in front, is not because it cannot be turned backwards during the traction, but because there is reason to fear lest the head, by being arrested by the contraction at the fundus of the uterus, may not follow the movement of rotation impressed on the thorax, whereby a torsion of the neck might result. Again, if the organ is inert enough to admit of the preliminary conversion advised by Velpeau, it would doubtless be sufficiently so to enable the accoucheur to direct his tractions in such a way as to bring the occiput in front, and the face into the hollow of the sacrum, without hazard.

of the hand, which would be almost as difficult as searching after the feet; and, lastly, to scarify the arm or amputate it, is a barbarous measure when the child is living, and generally useless when it is dead.

We repeat, it is not there that the genuine obstacles to the delivery are to be found; but it is rather against the violent contraction of the body and occasionally of the neck of the womb, that we are to act, by employing the measures recommended above. Should these fail, the course to be pursued will necessarily vary, according to whether the fœtus be living or dead. If still living, and the mother's condition does not absolutely demand a prompt delivery, we should hope, and wait for a spontaneous evolution. (See *Natural Labor.*) But if her life is seriously compromised, though the child be yet alive, its viability may be considered as destroyed, and embryotomy be resorted to. (See *Embryotomy.*) The reasons for this course will be still more urgent when there is a certainty of its death.

CHAPTER IV.

OF THE FORCEPS.

The forceps is a kind of pincers composed of two blades, very similar to each other, and which are specially intended to be applied on the head of the fœtus.

The honor of inventing this instrument has been attributed to several persons; but, at the present day, it is clearly established that the forceps was invented by a member of the family of the Chamberlens, who, during the first half of the seventeenth century, pursued the censurable course of holding it as a secret, by the aid of which they promised to terminate the most difficult labors. It would appear, however, that it soon became known to some of the English practitioners; for Drinkwater, who practised the art of midwifery from 1668 to 1728, made use of instruments which, if we may judge from the description given of them by Johnson, closely resembled those employed by the Chamberlens.

In 1670, one of the Chamberlens came to Paris for the purpose of selling his secret; since, according to the account of Mauriceau, he had proposed to the king's chief physician to make known his instrument for a remuneration of ten thousand crowns. As Chamberlen believed his process was applicable to all cases, he unfortunately promised to effect delivery in a woman whose pelvis was deformed to an extreme degree, and on whom Mauriceau had deemed the Cæsarean operation to be necessary. Consequently, as the French accoucheur had foreseen, all the attempts of Chamberlen to accomplish the delivery proved ineffectual, and he returned to England, abandoning all the glittering hopes of fortune that he had expected to realize on arriving at Paris. It would seem that he afterwards made a journey to Holland, about the year 1693, and communicated, or rather sold, some of his instruments to certain accoucheurs there, among whom Roonhuysen, Ruysch, and Backelman are particularly mentioned

In fact, it is almost certain that the famous lever of the former of these physicians had no other origin, and was only a slight and defective modification of the instrument he obtained from Chamberlen. However this may be, the forceps was likewise held as a secret for a long time in Holland, and it was not until sixty years afterwards, that is, about the year 1753, that Visscher and Van de Poll brought Roonhuysen's lever into general notice.

Palfyn, an accoucheur of Ghent, has also been incorrectly considered as the real inventor of the forceps. He made several trips to London and Germany, with a view of finding out this wonderful secret; which, according to Mauriceau, had furnished Chamberlen an income of more than thirty thousand livres per annum (an enormous sum for that period); and it is probable that it was in consequence of the information obtained in these two countries, that he designed the instrument for drawing upon the head (*tire-tête*), subsequently presented by him to the Academy of Sciences at Paris.[2]

Chamberlen's forceps underwent a number of modifications after it became public property, that were generally unimportant; and fortunate indeed was it when the so-called improvements did not render it more awkward and dangerous than before. But the middle of the eighteenth century opened a new era in the history of this instrument; for, about this period, two illustrious obstetricians, Levret in France, and Smellie in England, were struck with the necessity of accommodating the shape of the forceps to the direction and form of the pelvic axis; and, as a consequence, they thus enlarged the field of its application. Chamberlen's forceps was straight, and therefore only applicable when the head was low down in the excavation, and close to the perineum; but both of these gentlemen endeavored to render it capable of being applied to the head when still above the superior strait; and for that purpose they gave it a curve in the direction of its long

[1] We may remark that the instrument described by these last-named authors, under the title of Roonhuysen's lever, was not the one which the latter had bought of Chamberlen, for it is composed of a single curved iron blade. In 1747, Rathlauw published a description of an instrument that he had received from Van der Swam, a pupil of Roonhuysen, which was composed of two blades, having fenestræ in them, and joined at their extremity by means of a pin.

[2] This presentation, made at a time when Chamberlen's forceps were scarcely known in France, unjustly obtained for Palfyn the reputation of being its inventor. But, in our day, the question can no longer be considered doubtful, for, independently of the numberless proofs that establish the claims of the Chamberlens, they have recently been confirmed, says Dr. Edward Rigby, by a discovery made in the county of Essex. It appears that Dr. Peter Chamberlen purchased, towards the end of the seventeenth century, the estate of Woodham, Mortimer Hall, near Maldon, in Essex, which continued in the family till about 1715, and was then sold to Mr. Wm. Alexander, who bequeathed it to the Wine Coopers' Company. About the year 1815, the tenant in occupation discovered, in the floor in the uppermost of a series of closets, which are built over the entrance-porch, a trap-door. In the space between the flooring of this closet and the ceiling below were found, among a number of empty boxes, a cabinet containing a collection of old coins, divers trinkets, many letters from Dr. Chamberlen to different members of his family, and some obstetric instruments. These instruments, which were given to Mr. Carwardine by the lady of the mansion, and described by Rigby, exhibit the successive attempts made by the Chamberlens, before they succeeded in perfecting their forceps.

axis, so that the anterior border presented a concavity and the posterior one a convexity.

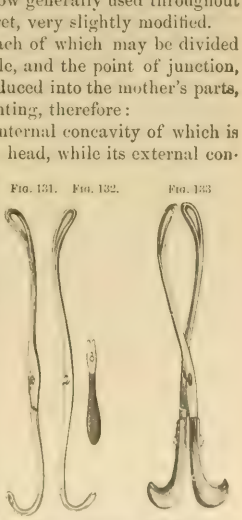
It is impossible to ascertain which of the two had the priority in originating this important modification of the forceps; for, though it is certain that Levret had such a curved instrument in 1747, and that Smellie did not announce his until 1751, yet the latter expressly declares that he had invented it several years previously; however, as his invention had not been made public, the merit of priority belongs to Levret.

Hundreds of modifications have been proposed since the days of Levret and Smellie, nearly all of which have fallen into oblivion; some of them were quite ingenious, but they imperfectly attained the end their authors had in view; and others were really destitute of value or utility. Consequently, we shall restrict what we had intended to say concerning its history to these few lines, and shall only describe the forceps now generally used throughout France, which is none other than that of Levret, very slightly modified.

The forceps is composed of two branches, each of which may be divided into three parts, namely: the blade, the handle, and the point of junction, or the lock. The blade is intended to be introduced into the mother's parts, so as to embrace the head of the fœtus; presenting, therefore:

1. A curvature on its flattened aspect, the internal concavity of which is destined to be applied to the side of the fœtal head, while its external convexity slips along the concave walls of the pelvis. 2. A curve on its edge, having the concavity anteriorly, which is made for the purpose of accommodating the form of the instrument to the direction of the pelvic axis; and to render an application of the forceps practicable even when the head is retained above the superior strait. The blade is usually provided with a fenestra, which serves to diminish the size and weight of the instrument, and has the further advantage of permitting the parietal protuberances to engage in the void thereby produced, which engagement compensates, to a certain extent, for the thickness of the branches. The old forceps were provided with a kind of bead around the periphery, and the internal face of the blades, which was made quite prominent, was intended to obviate the slipping of the head. But the contusions of the scalp, produced by this raised border, have led to its removal, and those now in use have the inner surface of the blades polished down with a file. Both handles of the instrument are usually bent to a slight degree at their extremity, in the form of a hook. One of them is much more curved than its fellow, and has, near its end, a hollow button, which unscrews and serves for the lodgment of a sharp hook, while the curve of the other scarcely reaches a right angle, so that we find the forceps, a blunt and a sharp hook, included in the same instrumen . The handles and blades are just alike on both branches, which

Fig. 131. Fig. 132. Fig. 133



131. The male branch. 132. The female branch. 133. The forceps locked

differ from each other only at their middle or articular part, where one of them is provided with a pivot and the other with a mortise, made either in the middle or on the side of the instrument, by means of which they can be firmly locked after their application. The branch bearing the pivot has received the name of the *male* (Fig. 131), and the other, having the mortise, that of the *female* branch, or blade (Fig. 132). The delicacy of certain accoucheurs has been shocked by these denominations, and they have endeavored to substitute for them the titles of the *left* and the *right* blades; but I cannot understand why the old names of the *pivot blade* and the *mortise blade* should not be retained; though I would willingly accept those of the left and the right ones if it were clearly understood which ought to be called the left and which the right. But unfortunately such is not the fact, for M. Velpeau designates that blade as the right one which Madame Lachapelle has called the left, and *vice versâ*. This discrepancy of terms creates great confusion in the mind of the reader, which we shall endeavor to avoid by retaining the names of the *male* and the *female* blades.

[Of all the parts of the forceps, the articulation has, perhaps, been the most frequently altered. In Levret's instrument the mortise is placed lengthwise in the centre of the female blade. In the articulation, the female blade has to be raised, in order to allow the pivot to pass through the mortise, when a turn of the pivot makes all secure. If the fingers are unable to turn it, a key made for the purpose may be used. (See Fig. 132.)

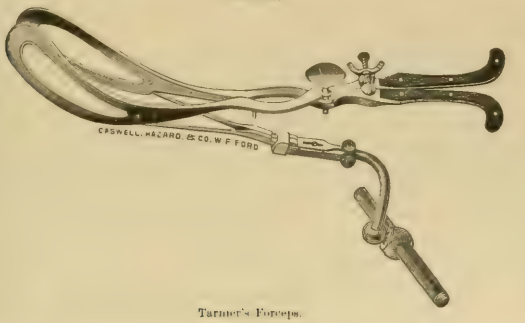
In Siebold's forceps, the place for the pivot is a notch in the side of the female blade, and the articulation is effected by simply bringing the two blades together and screwing down the pivot after it has entered the notch. This kind of articulation is the one now generally used.

The articulation of Brunninghausen's forceps resembles the preceding, with the exception that the pivot is a simple pin, which enters the lateral notch and holds the blades with sufficient firmness when the attempt is made to bring them together. The articulation of Smellie's instrument is effected by a sort of interlocking, the left blade having a notch which receives the articular part of the right one.

The forceps, besides grasping the head of the child, subjects it to compression, and if the operator uses too much force, or presses the handles too strongly together, the compression may be dangerous. To avoid this risk, Petit had a stop put between the handles of his forceps, which limited the extent to which they could be closed, and measured, as it were, the degrees of pressure to which the head was subjected. Lauverjat, and other accoucheurs, devised similar arrangements, which from time to time have been resuscitated, and deserve, perhaps, to be added to our modern instruments. Doubtless, with the same idea, M. Mattei within a few years past invented an instrument to which he gave the name of *leniceps*. The blades resemble those of Levret's forceps, but the usual handles are cut off at the point of articulation, and their place supplied by a transverse one, which is furnished with notches at intervals, so arranged as to allow the blades to be separated or brought together. The chief advantage of this instrument is its transverse handle, which fits well the operator's hand, and prevents too great compression of the head. Its disadvantages are, that it affords a less secure hold than Levret's forceps; and as the degree of separation of the blades is predetermined by the notches of the handle, it is impossible to regulate exactly the application of the blades to the sides of the head. In this respect, those forceps are preferable which are provided with a movable stop or a screw, which allows the degree of approximation to be regulated at will.

[Tarnier has devised a forceps designed to draw directly in the axis of the brim, and especially adapted to high operations, at the same time preventing lacerations of the maternal parts, and protecting the perineum. The instrument was formerly sigmoid in shape, but is now made without the perineal curve. Tractions are made by means of a transverse handle fastened to two movable rods attached to the lower curvature of the blades.

FIG. 134.



Tarnier's Forceps.

FIG. 134 *a*.

Wells' Axis-traction Attachment applied to Elliot's Forceps.

The introduction and application of this forceps is attended with greater difficulties than ordinary forms used, and, as shown by Professor Gustave Braun, of Vienna, the risk of contusion and of injury to the perineum is not materially lessened. There have been many modifications of the axis-traction forceps, notably those of Simpson and Lusk. A simple but efficient axis-traction *attachment*, which can be adapted to almost any forceps, has been devised by Dr. Brooks H. Wells. Its advantages are that it can be used with the forceps to which one is accustomed; that it is slipped into place only after the forceps have been applied and locked, and so does not interfere with their introduction; that it does away with the necessity of grooves or slots in the blades of the forceps, which are difficult to keep clean and are apt to carry septic material; that where much traction is necessary, as is greatly economizes the strength of the operator, even where the head is well down in the pelvic cavity, the transverse handle allowing the force to be applied most easily; that the compression force can be easily regulated, being made as slight or great as may be desired.—P. F. M.]

The forceps generally used in the United States are the long forceps, as modified by Hodge and Wallace, and the short forceps of Simpson, modified by Elliot and Bedford. The straight forceps are scarcely ever used. The Hodge forceps are designed especially to be adapted to the contour of the fœtal head, and to compress it without injury when the pelvis is more than normally narrow. The length of the instrument is 16 inches, the length of the blades 6 inches. The extremities of the blades are $\frac{1}{2}$ inch apart when the handles are in contact; the greatest width between the blades is $2\frac{1}{2}$ inches. The Wallace forceps is modified from the short, double-curved Davis instrument, consisting essentially of a Davis blade and the Hodge handle. It is 15 inches long; the blades are 6 inches long. The extremities of the blades are $\frac{1}{2}$ inch apart, the greatest width between them is $2\frac{1}{2}$ inches. It is a little heavier than the Hodge forceps. The fenestræ are more open, the shanks are nearly parallel, and the female blade occupies a position in front of the male blade. The Simpson forceps is $13\frac{3}{4}$ inches in length, the extremities of the blades are 1 inch apart, and the greatest width between them 3 inches. The Elliot forceps, the best for general use, are 15 inches long, the extremities of the blades are 1 inch apart, while the greatest width between them is $3\frac{1}{4}$ inches. The forceps of Simpson and Elliot have but little compressing power when compared with the Hodge or Wallace forceps.

FIG. 134 *b*.

Simpson's Forceps.

FIG. 134 *c*.

Hodge's Forceps.

ARTICLE I.

PRELIMINARY PRECAUTIONS.

The woman is to be placed in the position before recommended for the performance of version; the lower extremities being supported by two assistants standing on the outside of the limbs, and having the pelvis firmly held, so as to prevent her from giving way to any involuntary movements that might annoy the operator; of course, the breech ought to be brought to the edge of the bed. The patient should be placed in this position whenever nothing particular prevents, and more particularly when the head is high up, though it is not so necessary when the latter is at the inferior strait.

The English practitioners place the patient on her left side, the position in which the women of their country are usually delivered, taking care, however, to bring the pelvis nearer to the edge of the bed than usual. An assistant, standing on the opposite side of the latter, holds the patient steady, while another raises up and supports the right knee and thigh. But whatever be the position, one attendant is particularly charged with the duty of preparing and handing the blades to the accoucheur, as he may want them.

It is customary to warm the instrument by dipping it into hot water. Before using, it should be passed through the closed hand so as to be certain there is no danger of its burning the soft parts; the external surface of the blades should then be smeared with butter, cerate, or oil, with a view of rendering the introduction more easy. Baudelocque has laid down a precept that has been followed by most succeeding authorities, and to which it is advisable to conform; namely, to exhibit the forceps to the patient, concisely explain to her its use, its object, and its mechanism, and to make her understand its harmlessness. "It has not been my fortune," says Madame Lachapelle, "to meet with any one who was not tranquillized by such an explanation, and I have often known persons in their second labor to solicit their application from having experienced the relief they afforded in the first."

Everything being prepared for the operation, we must next ascertain the position of the head with the greatest possible care; for even though it had been recognized at the commencement of the labor, the former diagnosis ought to be confirmed by a fresh examination, lest the head may have changed its position since then. By this exploration, the size of the head, its reducibility, and its softness, the perfect or defective conformation of the pelvis, the degree of contraction, if any exists, &c., will be made out as far as possible; and as the dilatation or the dilatability of the os uteri is even more indispensable here than in the case of version, we must be certain that this condition exists. After which we are to proceed to the introduction of the blades.

ARTICLE II.

GENERAL RULES.

1. *The instrument ought only to be applied on the head of the fœtus*, whether the latter be flexed or extended, that is to say, in the vertex and face presentations; or whether it alone remains behind, presenting by its base after the delivery of the trunk. Certain obstetricians have recommended the instrument to be applied on the pelvis in the presentations of the pelvic extremity, where from any cause it may be desirable to terminate the labor promptly. But the bones of the pelvis are too deficient in solidity, and their articulations offer too feeble a resistance to be able to support the pressure made by the forceps without hazard. Besides, it would be difficult to get the breech in the hollow of the blades, without carrying their points above the iliac crests against the soft walls of the abdomen, thereby producing a more or less serious contusion of the abdominal organs. As a

general rule, the breech presentations do not appear to me to warrant the use of the forceps. I am aware, however, that M. Stoltz recommends its employment under such circumstances, and I am induced to believe that M. P. Dubois would not hesitate in resorting thereto, in some cases where direct tractions on the pelvic extremity might be difficult.

2. *The blades should be applied as nearly as possible on the sides of the head, in such a way that the concavity of their margins shall be directed towards that part of the head which is to be brought under the symphysis pubis.*—This rule is not always feasible, for it will be seen hereafter that it is impossible to carry it out in some cases of transverse positions, in which we are obliged to seize the head over the forehead and occiput; but these exceptions are rare, and the operator should endeavor to follow the rule in all cases. When the forceps is thus applied, each blade bears on the lateral parts of the cranium; the parietal protuberances are found in the opening of the fenestræ, at the point where the blades are the most widely separated from each other; and the occipito-mental diameter corresponds very nearly to a line drawn from the extremity of the blades towards the pivot.

3. *As a general rule, the posterior blade ought to be introduced first.*—As the head is placed in a transverse or diagonal position in a vast majority of cases, one of its sides will look forwards and the other backwards, and, therefore, one of the blades will be at the fore and the other at the hinder part of the pelvis, since we have just seen that it is requisite to apply them on the sides of the head. Now it is the one that goes to the back part of the pelvis that we recommend to be generally introduced first. In theory, this is even admitted as the absolute rule, since it is considered to be the most generally applicable; for everybody acknowledges that the positions in which the occipito-frontal diameter corresponds to the left oblique one of the pelvis are the most frequent of all. But it must be borne in mind, that in practice there is no invariable law, and the one we lay down is subject to very numerous exceptions. If desirable, however, to establish a universal principle for the operation, we might say, that the blade, the application of which presents the greatest difficulty, ought to be introduced first. After all, it must be left to the skill and tact of the accoucheur to decide at the bedside of the patient which branch must be introduced first, for it is out of the question to anticipate, in a book, or even to imitate on the manikin, all the peculiarities that may there influence his decision. For instance, when the head is high up in the excavation, it would sometimes be better to reverse the rule, and introduce the anterior blade first.

4. *The male blade is always to be held in the left hand, and is to be applied at the left side of the pelvis; the female blade is to be held in the right hand, and is always to be applied at the right side of the pelvis.*

M. Hatin has lately suggested a method which bears considerable resemblance to that employed by Flamand in some exceptional cases. It consists in the introduction of both branches by the same hand. The left hand preferably, is carried to the fundus of the uterus, or at least to the parts to which the forceps are to be applied. The first branch having been introduced along the hand which serves as a guide, the latter, without quitting the head of the fœtus, passes around it, and places itself on the opposite side to receive and guide the second branch of the instrument.

This process, represented by M. Hatin to be the easiest, and especially the least dangerous for both mother and child, does not appear to me to possess all the advantages claimed for it by Flamand and M. Hatin. As M. Stoltz judiciously remarks, it can have no advantage except when the head is movable, or previously rendered so, above the superior strait, in which case we have already seen that pelvic version is preferable, even though the pelvis be slightly contracted.

When the head is wedged in the superior strait, or more or less engaged in the excavation, it seems to me that the ordinary process is incontestably superior.

Fig. 135.

Introduction of the first branch.

5. *The free hand, or the one not engaged in holding the blade, should always be introduced first, so as to direct the latter.* — When the head is at the inferior strait, it is usually sufficient to insert two or three fingers between the side of the head and the pelvis (see Fig. 135); but whenever it is high up, the entire hand must be introduced into the vagina, taking the precaution to place the ends of the fingers between the head and the os uteri so as to be certain that the blade, by slipping along the palmar surface of the hand will get into the uterine cavity, and not pass externally to the cervix, perforate the cul-de-sac of the vagina, and penetrate into the peritoneum. The convex surface of the blades glides along the palmar surface, and the convex margin along the cubital border of the hand; in a word, this previous introduction of the latter is intended to protect the vaginal wall from the contact of the instrument.

6. *At what part of the pelvis should the blade be first introduced?* — This question has been variously answered: thus, Baudelocque directs it, in nearly all cases, immediately on the point where it is to remain after the locking. Levret (and M. Velpeau adopts nearly the same view recommends that the two blades be introduced at the posterior quarter of the pelvis: that, in the diagonal positions, one of them be left in front of the sacro-iliac symphysis, but that the other be brought forward opposite to the cotyloid cavity which corresponds with the anterior side of the head, by making it traverse the whole lateral half of the pelvis from behind forwards. Lastly, Madame Lachapelle has proposed a mixed method, composed, in part, of both of the preceding: namely, both branches are first introduced in front of the sacro-sciatic ligament, and then the one which should remain posteriorly is pushed directly up to the sacro-iliac articulation; but the other

is brought forward at once opposite to the cotyloid cavity in the following manner: "I insinuate the extremity of the blade just in front of the sacro-sciatic ligament; then, as it passes in, I gradually depress the handle between the thighs, until it is inclined much below the level of the anus; by this manœuvre, the point of the blade is made to describe a spiral movement, which is directed and completed by the fingers introduced into the vagina By this movement, the blade is carried upwards and forwards at the same time, so that it is made to pass around the head in an oblique direction, which would be represented by a line extending along the interior of the pelvis from the sacro-sciatic ligament to the horizontal branch of the pubis." This mode of procedure is also adopted by M. P. Dubois, and is the one which appears to us the easiest of all. It should be understood, however, that it is only applicable when the head is already engaged in the excavation. The reader will see, hereafter, that above the superior strait the branches are applied on the sides of the pelvis without any particular reference to the position of the head. Finally, some of the German accoucheurs recommend the blades to be placed on the sides of the pelvis in all cases, without regard to the position of the head. This precept is followed as a matter of necessity when the head is high up. But when engaged in the excavation, it will be found better in the majority of cases to follow the rule which we have given.

7. *The second blade is always introduced above and in front of the first;* so that, in some instances, the male branch is found over the female one, as in Fig. 136; *i.e.* between it and the symphysis pubis. It will then be necessary, in locking the blades, to cross the handles, by making the female one pass above the male. Attempts have been made of latter time to avoid this crossing, and a particular kind of forceps has been devised by Tureaux, Tarsitani, and some others for the purpose, which can be made to lock whatever may be the relative position of the handles. This is doubtless an advantage, but its importance has certainly been exaggerated.

Fig. 136.

Introduction of the second branch.

8. *No force should ever be used in pushing the blades up.* — The obstacles met with during their introduction are nearly always created by folds of the scalp or vagina, in which the point of the blade becomes entangled; or else the difficulty is owing to

the circumstance that the blade, being improperly directed, is not pushed up in the line of the pelvic axis, and consequently strikes against the vaginal walls. These are easily obviated by varying the direction of the instrument a little, or by carrying its handle towards one or the other thigh, and by depressing or elevating it in a slight degree. Force is always useless and may be injurious. Thus, if the point of the male blade was arrested by a fold of the scalp, the instrument should be partially withdrawn, and its handle be carried toward the right thigh, whereby the extremity of the blade would be somewhat removed from the head, and could thus pass beyond the obstacle; but if, on the contrary, it were arrested by one of the transverse folds of the vagina, the handle should be carried toward the left thigh, so as to make the point rest against and slip over the head.

The introduction of the second branch is generally the most difficult, and the difficulty is generally greatest when it is necessary to introduce it the first. When attempts, prudently made, prove fruitless, there should be no hesitation in withdrawing both branches, and beginning again with the one which before was introduced last. It were much better to renew the operation two or three times, than to strive pertinaciously against difficulties which could never be surmounted without endangering to a greater or less extent the life of the fœtus, or the integrity of the maternal organs.

In withdrawing the branches, they should be made to describe a curve the opposite of that which they followed during their introduction; the handle of the male branch, for example, should be gradually raised above the pubis, and reclined obliquely upon the left groin.

9. *Mode of locking.* — In general, the locking is easily effected by bringing the two branches together after their introduction and adjusting the pivot in the mortise (Fig. 137), when an assistant turns the former; but this part of the operation demands a perfect parallelism between the two portions of the forceps which, unfortunately, does not always occur. For it frequently happens that the pivot does not fit into the mortise exactly, either because one or both blades are turned outwards, or because one has penetrated deeper than the other. In the former case, we should endeavor to correct the deviation gently, by grasping the handles with the whole hand, and in the latter by withdrawing or pushing up one of them. But in none of these attempts should much force ever be used; for when considerable difficulty is met with, it is probably owing to an improper adjustment of the instrument, and it is far better to extract one or even both blades than to force their locking.

Fig. 137.

The forceps applied and locked.

10. *We must be satisfied that the head is properly secured, and that it alone is included in the clams of the instrument.*—To be convinced that no part of the mother's organs is pinched between the head and the forceps, it is only requisite to make a moderate pressure on the handles, after the locking, when, if the patient does not complain of pain, the operation may be continued without danger; if the contrary is the case, the forceps ought to be unfastened, and the included part be removed by the finger. A few gentle tractions made by the forceps, without compressing the head too much, will serve to show whether the latter is properly secured, and that the instrument does not slip.

11. *The tractions ought to be made in the direction of the pelvic axis.*—If the head is at the superior strait, we must first draw downwards and backwards as much as possible; then, as it descends into the excavation, the handles are gradually elevated, so that, by the time it reaches the inferior strait, they are found directed forwards and somewhat downwards; and the tractions will then be made in this latter direction. But whilst the head is undergoing its movement of extension, the instrument must be carried up in front of the symphysis pubis, and afterwards of the abdomen, so that, after the complete delivery of the head, the forceps shall be lying almost horizontally over the woman's belly.

In performing the tractions, the right hand is placed near the clams and above the instrument, the left hand in front of the articulation and beneath. But as soon as the disengagement is to be effected by raising the instrument above the pubis, the position of the hands must be changed, and the left one always be placed in front of the pivot, but above, and the right one below the extremity of the branches.

The tractions are to be made during a pain whenever possible, and the patient should be encouraged to bring the abdominal muscles into play, in aid of the uterine contractions and the efforts of the accoucheur. As soon as the head has cleared the inferior strait, and when it only has the resistance from the soft parts to overcome, the vulva being at the same time freely dilated, all tractive force should, as a general rule, be abandoned, and the rest be left to the powers of nature; for the mere presence of the head at the external parts, by the tenesmus it gives rise to, will most certainly bring on a sufficient degree of contraction to effect the delivery.

Be satisfied, then, with facilitating the process of extension, by carrying the handles up in front of the pubis during the mother's bearing-down efforts; the dilatation of the vulva, being thus slow and gradual, will be accomplished without any danger of rupture, especially if you are careful to sustain the perineum, or, still better, to have it supported by an assistant; for, had you continued the tractions, such a rupture could scarcely have been avoided. Madame Lachapelle even advises the instrument to be withdrawn altogether; but I think it is better to leave it *in situ*, for the double interest of the patient and the accoucheur: of the patient, because, in some cases, a few tractions may yet be necessary; and of the physician, because, if he remove the forceps from prudential motives, and with a view of saving the parts, before the final delivery of the head, he might be regarded by the woman and her attendants as a bungler, who had failed in his operation.

He should, therefore, leave it applied, and allow the patient to expel it and the head together.

In cases attended with difficulty, we might doubtless draw on the handles with a certain amount of force; but the example of some practitioners who, taking a point of support by placing a foot against some solid body, hang, as it were, on the handles of the forceps, and then pull away with all their strength, should never be followed. It is only necessary to use the arms, and the operator should take such a position that his body would always arrest any sudden slipping of the blades. In fact, it is this precaution which sometimes renders an application of the forceps so excessively fatiguing to him.

12. *In the oblique or transverse positions, such a movement of rotation is to be imparted to the head as shall bring the concave margin of the blades directly in front.*—This rotation ought to be performed during the tractions, just as the head is approaching or clearing the inferior strait. But there is no occasion for any violent exertions, for most generally the head turns in its descent, carrying the instrument along with it in the rotation. Sometimes, also, an application of one or both blades is all that is necessary to effect this change.

ARTICLE III.

SPECIAL RULES.

We have already stated that the forceps may be applied in the vertex and face presentations, and on the head when left behind after the delivery of the trunk. Its application is, therefore, to be studied in these three varieties; and as the greater or less elevation of the head greatly influences both the course to be pursued and the degree of facility with which the operation is accomplished, we shall examine those cases successively in which it has reached the inferior strait, in which it is still engaged at the superior strait, and in which it is entirely above the latter.

§ 1. Application of the Forceps in Vertex Positions, when the Head has reached the Inferior Strait.

The vertex, having descended to the inferior strait, may be found in correspondence with the various points of its circumference; and, therefore, to meet every possible case, we shall have to admit eight principal positions of it: thus, the occiput may be in relation with both extremities of the coccy-pubal diameter (the occipito-anterior and the occipito-posterior positions); with both extremities of each oblique diameter (the left anterior and the right posterior occipito-iliac, and the right anterior and the left posterior occipito-iliac positions); and with both extremities of the transverse diameter (the left and right transverse occipito-iliac positions).

A. *Occipito-anterior Position.*—In this position, the occiput is placed behind or under the lower part of the symphysis pubis; the sides of the head corresponding to those of the pelvis. The male blade will here be introduced first, because it will be found underneath in the locking. Two or three fingers of the right hand having been passed into the vagina, this branch is seized by the left hand, either with the fingers, like a writing-pen, or, still better, with the whole hand (though in both cases close to the pivot),

and it is held inclined obliquely over the right groin; the point of the blade is then entered at the vulva in the direction of its axis, and is slipped up along the palmar surface of the fingers; as the blade is passed into the vagina, the handle is gradually depressed between the woman's thighs (of course, always approaching towards the median line) in such a way as to direct the point of the blade in the direction of the axis of the excavation. The blade is thus directed at once upon the side of the head, and along that of the pelvis, where it is ultimately to be placed. While this manœuvre is being effected, the convex border of the blade ought to rest upon and glide along the ring-finger of the right hand, which is in the vagina, whilst at the same time its concave surface should bear exactly on the convexity of the head, and follow its outline. The female blade is then introduced in the same manner precisely. Two or three fingers of the left hand are first passed in on the right side of the pelvis; the branch being held obliquely by the right hand in front of the left groin, with its point resting on the palmar surface of the left hand, is presented at the vulvar orifice; and as its extremity is made to enter, the handle is depressed, and brought towards the median line by degrees, the blade being thus passed up on the right side of the pelvis, with the same precautions as in the former case.

Fig. 138.

The forceps applied on the child's head in the occipito-anterior position, at the inferior strait.

When both blades have penetrated to the same depth, they ought to be parallel with each other, the pivot corresponding to the mortise exactly; and the locking is then completed without difficulty.

As the head is at the inferior strait, the first tractions will have to be made in the direction of the axis of this strait, that is to say, a little downwards and forwards; then, as soon as the occiput has passed under the sub-pubic ligament, and the head has commenced its movement of extension, the instrument is to be gradually carried upwards in front of the symphysis and abdomen.

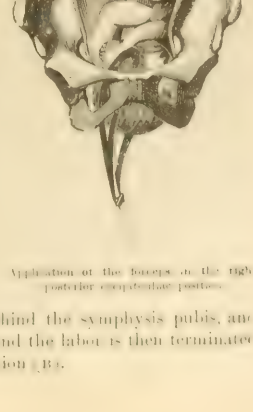
B. *Occipito-posterior Position.*—The blades are applied and locked as in the preceding case. But here, notwithstanding the head is at the inferior strait, we are not to draw in the line of axis of this strait; because, in these occipito-posterior positions, the occiput has to be delivered first at the anterior perineal commissure. (See *Natural Labor.*) To effect this object, it is necessary to carry the handles a little upwards at the very outset of the tractions, so as to flex the head on the chest more completely; being careful to operate in such a way that the artificial aid may bear particularly on the larger extremity of the head. When the occiput has gained the perineal commissure, the traction is discontinued, or rather, if there is any further occasion for it, we may draw moderately, at the same time depressing the handles of the instrument towards the anus.

[The head should be extracted very slowly, because the highly distended perineum, which bulges greatly before the occiput, would inevitably give way under an attempt at too rapid delivery. The operation is far more troublesome than in a case of occipito-anterior position, and as it requires the use of greater force, demands also the exercise of great care and prudence to avoid a laceration.]

c. *Left Anterior Occipito-Iliac Position.*—In this position, one side of the head looks forward and to the right, the other backward and to the left; and the blades are to be applied in a corresponding manner on the sides of the head. The posterior blade, which should be entered first, will at the same time be on the left, and, therefore, the one that is always passed on the left side of the pelvis, that is to say, the male blade, will be introduced first. This is held in the left hand just in front of the right groin; and its point, placed in front of the left sacro-sciatic ligament, is to be pushed directly backwards as far as the sacro-iliac articulation, whilst the operator depresses the handle and draws it towards the median line. In carrying the handles down between the mother's thighs, it is highly important to keep the blade slightly everted. Being once introduced, the handle is given to an assistant, who holds it near the internal surface of the left thigh.

The female blade is to be placed behind the right cotyloid cavity, where the side of the head is found, by making it describe the spiral movement alluded to when speaking of the general rules of the operation. The operator accomplishes this by taking it in the right hand, in the usual way, and entering the point of the blade just in advance of the right sacro-sciatic ligament; then, pushing it in this direction for about an inch, he suddenly changes the position of his hand so as to get hold of the instrument from above, when, by strongly depressing its handle along the internal surface of the left thigh, he makes the blade execute a see-saw movement, by which it is at once carried from the right sacro-sciatic ligament up opposite to the cotyloid cavity of the same side; and then the locking is effected. (Fig. 139.) During the early tractions he should endeavor to rotate the head so as to bring the occiput behind, and then under the symphysis pubis. The rest of the operation is completed as in the first variety (A).

FIG. 139.



Application of the forceps in the right posterior occipito-iliac position.

D. *Right Posterior Occipito-Iliac Position.* The forceps are applied here exactly in the same way as they were in the preceding case; the blades being entered, the one behind and to the left, the other in front and to the right (see Fig. 139); their concave margins looking towards the forehead. As this latter part must be brought in front, the object of the rotation will be to get it behind the symphysis pubis, and the occiput into the hollow of the sacrum; and the labor is then terminated just as in an original occipito-posterior position (B).

[The effort required is sometimes so great, that some operators have thought it would be better, in very difficult cases, to rotate the forceps upon its axis, in order to turn the head in the cavity of the pelvis, as it sometimes turns spontaneously, rolling the occiput, in fact, from behind forward, bringing it first to the side of the pelvis and finally behind the pubis. The plan has numerous opponents, who say that it turns the head through more than a quarter of a circle, whilst the body is held fast by the contracted uterus and thus exposes to the occurrence of fatal lesio is in the cervical region of the spinal column.

These objections are more theoretical than real, and we have endeavored to refute them in another work (*Accouchements*, par Lenoir, Sée, et Tarnier). At any rate, clinical facts have proved that the occiput may be brought to the front and a living child born in an occipito-posterior position.[1]

[1] A young woman, pregnant with her first child, having reached her full term without accident, was taken with her first pain on the 29th of October, at nine P. M. The pains, though feeble, were yet so frequent as to prevent her sleeping. At six o'clock on the morning of the 30th, I found the neck completely effaced, and the thinned edges circumscribing an orifice of about the size of a dime. The pains occurred every ten minutes. I found the vertex presenting, but could not make out the position. The pains continued all day, the 30th, but quite as feeble and distant. At four o'clock in the evening they became stronger and more frequent, and at eight o'clock the diameter of the orifice was rather less than that of half a dollar. The membranes being flattened and applied closely to the head, enabled me to discover the biparietal (*coronal*) suture running directly from before backwards, and *on several different occasions* I distinctly felt the anterior fontanelle presenting directly forward and corresponding nearly with the upper third of the posterior surface of the pubis. I had to deal with what had never before occurred to me, a *direct occipito-sacral* position, engaged in the upper third of the excavation. I hoped in vain for its spontaneous conversion into a posterior diagonal position, for, notwithstanding very frequent and powerful contractions, things were still in *statu quo* the next day, the 31st, at six o'clock. The orifice was at this time dilated to the size of a dollar. At noon, the dilatation was almost complete, and finally, at two o'clock, the head assumed a diagonal position. I detected very positively the anterior fontanelle in front and to the left, and hoped that the movement of rotation would continue. I was doomed to be disappointed. I then ruptured the membranes, but this was followed by the escape of but a few spoonfuls of fluid. At four o'clock, the anterior fontanelle had approached, I thought, somewhat nearer the left extremity of the transverse diameter, and I encouraged the poor patient to believe that her labor would soon be terminated; but, unfortunately, instead of continuing to pass backward, the anterior fontanelle underwent a movement in the opposite direction, and, notwithstanding all my efforts to push it back, it again came forward, and fixed itself opposite the horizontal ramus of the pubis, from which it did not stir afterward. At ten o'clock in the evening, things being in the same condition, I determined to apply the forceps, as much in the interest of the mother whose strength was exhausted, and who begged me to deliver her, as in that of the child.

The head was then very near the inferior strait, and the forceps were applied without difficulty upon its sides. I made traction, with the object of disengaging the occiput in front of the perineum, but the contractions were feeble, and the woman being exhausted with fatigue, was unable to assist the efforts of the uterus, and being thus reduced to the mere tractions with the instrument, I could not make the head advance. In spite of all my efforts, I was unable to overcome the great resistance of the perineum which was very thick and unyielding, so that my attempts were altogether fruitless. If I abandoned the operation, I had nothing to rely upon but the resources of nature, which here were unfortunately, powerless, or else the performance of craniotomy I had waited long enough to test the powers of the organism, besides which, a more prolonged expectation would not be devoid of danger to both the mother and child. Therefore, before deciding on craniotomy, I determined to try whether it

When, in a posterior occipito-iliac position, it is found very difficult to depress the occiput, it is allowable to bring it to the front. To effect it, the forceps are to be rotated so as to bring the occiput first to the side of the pelvis in a transverse occipito-iliac position. When this happens, one of the blades is directly in front and the other directly behind, provided, the head was seized from one ear to the other. The instrument is then to be disarticulated, in order to reapply it as in a primitive transverse occipito-iliac position. In a future paragraph it will be told how to proceed to this application. (See *Application of the Forceps in Transverse Positions.*) Some operators, however, do not fear to complete the rotation without unlocking the instrument, which has then an abnormal direction, the smaller curvature being behind and the large convex one in front, the male branch to the right and the female to the left, and all without any great inconvenience, provided the operator be adroit. Nevertheless, the direction described is one to which Levret's forceps is not adapted.]

E. *Right Anterior Occipito-Iliac Position.*— In this case, the female blade is entered just in advance of the right sacro-iliac articulation. Then the male blade is introduced in front of the left sacro-sciatic ligament, and is made to describe the spiral movement before indicated, by which it becomes placed opposite to the left cotyloid cavity. The movement of rotation will be effected from right to left, and the occiput be brought under the pubic arch.

F. *Left Posterior Occipito-Iliac Position.*— The blades are introduced in a similar order, and in the same way, as in the preceding case. The movement of rotation is also effected in the same direction, but here it will bring the forehead instead of the occiput behind the symphysis. The handles of the instrument are next carried up a little in front of the pubis, with a view of freeing the occiput first at the anterior perineal commissure. After this is accomplished, the handle is to be depressed towards the anus, so as to assist the head in its movement of extension.

[In case it should be found difficult to disengage the occiput posteriorly, the head may be turned so as to bring the occiput behind the pubis; in short, to follow the same course as indicated for the right posterior occipito-iliac position (D). It will be understood that in this case, the head is to be turned from behind forward, and from left to right, in accordance with the same route which it usually follows in natural delivery.]

G. *Left Transverse Occipito-Iliac Position.*— In this variety, the occiput corresponds to the left extremity of the transverse diameter of the pelvis;

would not be possible to bring the occiput in front. I left off the tractions, and rotated the forceps on its axis, and carrying the head along in this movement, I had soon directed the concavity of the edges of the instrument toward the internal surface of the left thigh. I then withdrew the instrument and found that the longitudinal suture was directly transverse. Introducing the female branch behind and to the left side, I used it as a lever, and succeeded with it in bringing the occiput almost directly to behind the right acetabulum. The male branch was then placed behind the left acetabulum, and the forceps being locked after uncrossing the branches, I brought the occiput first behind, then beneath the symphysis pubis, and finished the extraction of the head by the usual movement of extension.

The child was born in an evident state of congestion. I allowed the cord to bleed before tying it, and it was soon restored. Two weeks afterward it was still living and well. The lying-in was unattended with accidents and the mother recovered quickly. The whole duration of the labor was fifty hours.

one side of the head looks directly forward, and the other backward. Here also the posterior blade is to be introduced first: now to distinguish which will be the posterior one under such circumstances, we must ascertain to what part of the pelvis the present posterior side of the head will correspond after the rotation shall have been completed. As this process of rotation, in the transverse positions, must always bring the occiput in front, the left, or posterior side of the head, will then look towards the mother's left ilium, and consequently the left or *male* blade is entered first. This blade is, therefore, pushed towards the left sacro-iliac articulation, and when it has penetrated to the proper depth, it is pressed into the hollow of the sacrum by bearing on its concave margin with the fingers already in the vagina. The female blade is next to be passed up by means of a spiral movement, behind the right acetabulum; and then the hand in the parts must endeavor to work it towards the median line, by pressing on its convex margin, so as to get it just behind the symphysis pubis. From the extent of the rotation to be effected, of course the accoucheur must be very careful to operate slowly and gently.

Fig. 140.

The forceps applied and locked in the left transverse occipito-iliac position.

When the head is in a transverse position, it is occasionally still high up in the excavation, even though it has, in a great measure, cleared the superior strait; and when this occurs, it is often exceedingly difficult to apply one of the blades in front and the other behind; in some cases even we are obliged to enter them on the sides of the pelvis, that is, to seize the head by the forehead and occiput. This is always an unfavorable circumstance; although it may possibly happen that the mere application of the instrument will be sufficient to give the head an oblique or even a direct antero-posterior direction; and when this movement does not take place at the time the blades are entered, it is often effected afterwards by their locking, or during the first tractions. Again, when the forceps is thus applied, the head may occasionally clear the inferior strait in a transverse position; but, having reached the vulvar orifice, it then turns between the blades, or, as I have several times observed, carries the instrument along with it in the movement of rotation, in such a way that, when the occiput is turned forwards, the concave border of the blades looks towards one side. In this latter case, some practitioners recommend the instrument to be withdrawn as soon as the head has nothing but the resistance of the soft parts to overcome, and, if necessary, to reapply them to the sides of the head. I think it would be better to remove the forward or sub-pubic blade only, for its presence might retard the process of extension, but to leave the perineal one

applied, because, in case of necessity, it may act as a lever in facilitating the extension.

The difficulty experienced in applying the forceps on the parietal protuberances in the transverse positions engaged in the excavation, often becomes (see hereafter) an impossibility, when the head is arrested at the superior strait or above it. To render the biparietal application possible, M. Baumers, of Lyons, has constructed a new forceps, which I have had occasion to try, and which appears to me to overcome the difficulty mentioned. I am convinced that the biparietal application of the blades, which is impossible with the ordinary forceps, is sometimes easy with that of M. Baumers, and I think it right to recommend their application in the transverse positions. They differ from Levret's forceps in being curved on the side instead of the edge, so that the general curvature of one of the branches is concave, and that of the other convex. For further details respecting this instrument and the mode of applying it, see the *Gazette Médicale des* 14 *et* 21 *juillet*, 1849.)

This modification of M. Baumers is altogether similar to that suggested by Uytterhoeven. This Belgian surgeon, it is stated by M. Van Huevel, constructed, forty years ago, a forceps with the blades curved forwards on their sides, as the others are on the edges. (See the Atlas accompanying the Belgian edition of this work, Fig. 194.)

H. *Right Transverse Occipito-Iliac Position.*—In this position, the application of the forceps scarcely differs from the one just described, excepting that the female branch is introduced first, and the movement of rotation is to be made from right to left, and from behind forwards. When the occiput gets behind the symphysis pubis, the labor is to be terminated as in the preceding case.

§ 2. Application of the Forceps in the Vertex Positions, where the Head is merely engaged at the Superior Strait.

Whenever the head is engaged or locked in the superior strait, and the vertex occupies the whole upper part of the excavation, the rules for guiding us in the application of the forceps are the same as those already laid down for its use at the inferior strait. We must remark, however, that its elevated position renders an introduction of the whole hand into the vagina more necessary than ever; that the points of the fingers ought to be carefully placed between the head and the cervix uteri, so as to direct the blade, which is slipped along the palmar surface of the hand, directly into the uterine cavity; that, as it is higher up than usual, the blades are to be pushed further in, in order to grasp it freely; and lastly, that, as the head is not yet clear of the superior strait, the first tractions must be made in the direction of the axis of that strait, or in other words, as far backwards and downwards as possible.

But, although the theoretical precepts remain unchanged, it must not be supposed that the difficulties are no greater here than in the former case; for the elevation of the part renders the application of the forceps more difficult and less certain, as it is not an easy matter to apply the blades on the sides of the head, in the oblique and more especially in the transverse

positions. In a word, the higher up it is, the more likely are we to encounter those difficulties and dangers about to be described in applying the instrument on a movable head above the brim of the pelvis.

§ 3. Application of the Forceps in the Vertex Positions, when the Head is movable above the Superior Strait.

There are many circumstances that may require the intervention of art, even while the head is still above the superior strait; and as the nature of these causes of dystocia may have a bearing on the operative procedure for terminating the labor, we must here take them into consideration.

The intervention of our art may be rendered necessary by an accident that endangers the life of the mother or child, such as hemorrhage, convulsions, or a descent of the cord, &c., as also by a contracted pelvis or an excessive volume of the head. In the latter case, a resort to the forceps is proper, provided the disproportion between the pelvic dimensions and the size of the head be not very great; since it has elsewhere been shown (see *Deformities of the Pelvis*) that, whenever the smallest diameter of the pelvis amounts to three inches, there is reason to expect that delivery can be effected by means of the forceps.

The question arises, whether version or an application of the forceps is to be resorted to in those cases in which the pelvis is properly formed, but some accident has taken place that requires a speedy termination of the labor? Under such circumstances, we do not hesitate to recommend pelvic version; but as this is not the universally received opinion, we extract from Madame Lachapelle the following reasons on which we ground our preference:

"An application of the instrument upon a head which is still above the superior strait is both a difficult and a dangerous operation. Difficult, 1st, because its elevation renders the diagnosis of the position obscure, and often leaves us operating in the dark; 2d, from its mobility it escapes from the forceps, and not unfrequently it is merely held by the points or margin of the blades; so that, as soon as any resistance is met with from the first tractive efforts, it slips out just like a cherry-stone when squeezed between the fingers; and, 3d, because at this height it is impossible to apply the blades on the sides of the head, since the latter is usually found either in an oblique or in a transverse position. Now, to conform to the rule generally laid down, we should apply one blade in front and the other behind, but this is obviously impracticable, for the curvature of the pelvic axis prevents the forceps from passing far enough in, unless the blades are introduced along the sides of the pelvis.[1] Dangerous, because the hold on the

[1] When an attempt is made to apply them over the parietal regions, the perineum presses the instrument forward, and gives it such a degree of obliquity with regard to the superior strait, that there is not room enough between the fenestræ for the reception of the smallest-sized head. The latter, being placed above the abdominal strait, has its long diameter situated very nearly in the line of the axis of that strait; but as the long axis of the head ought to correspond with that of the blades, it therefore follows that the forceps must be introduced in the direction of the axis of the upper strait; and, consequently, that the articular part of the instrument is to be depressed beyond the point of the coccyx. But the perineal resistance will evidently prevent

head, being very imperfect, in consequence of the difficulties just enumerated, the instrument may slip; and, should such slipping take place while we are making strong tractions on the handles, the edges of the forceps, acting like a cutting instrument, might seriously wound the cervix."

We, therefore, prefer version in the case under consideration. However, there is one instance which might demand the use of the forceps; that is, where the uterus is so contracted on the child's body after the discharge of the waters, as to render an introduction of the hand or an evolution of the fœtus absolutely impossible; but fortunately, in such a case, the head would be so firmly held at the strait, during the strong contractions of the organ, as to be nearly immovable.

On the whole, then, the application of the forceps above the superior strait should be limited to those cases of pelvic deformity in which the shortest diameter of the pelvis does not exceed three to three and a quarter inches, and to those in which the uterus is firmly contracted.

Mode of Application.—Unless the position is directly antero-posterior, which is extremely rare, no attempt should be made to apply the blades upon the parietal protuberances, but they should be passed along the sides of the pelvis. It is, however, very unusual for this precept to be followed in practice, and for the blades to be really placed upon the two extremities of the transverse diameter; when the head is diagonal, the blades are naturally directed toward the two extremities of one of the oblique diameters. Now in the directly transverse positions, this is what generally happens, even when the surgeon wishes to place them at the sides of the pelvis; for at this elevation, and especially in the sacro-pubic contractions, which are the most common, the head is almost always in a transverse position; now, according to the remark of Ramsbotham and of Simpson, and notwithstanding the formal precept always to apply the blades to the sides of the pelvis, it is found after delivery that the head has not been seized from the forehead to the occiput. The marks of the blades are almost always to be discovered upon one of the occipital protuberances and the parietal projection opposite. It is natural, in fact, if the head is transverse, for its long diameter to correspond with the transverse diameter of the pelvis. Now, as the latter is narrowed from before backward, the blades can be applied readily, only by directing one of them behind the acetabulum, and the other in front of the sacro-iliac symphysis, which are the only points not occupied by the head. This, therefore, is the direction which should be given them in all cases.

As soon as the forceps are applied, it would in most cases be advisable to tie the handles together before drawing upon them. At first, the tractions should be made as far back as possible, and the instrument ought to be gradually brought forward as the head descends into the excavation. The head, seized by one coronal boss and the opposite occipital protuberance,

thus, when one blade is entered behind the pubis and the other in front of the sacrum. Therefore, we are obliged to introduce the blades along the sides of the pelvis, that is, to seize the head by the forehead and occiput in the transverse position, and by the coronal and occipital protuberances in the oblique positions. M. Baudelocque's instrument might in some cases overcome these difficulties.

will soon reach the inferior strait. In thus traversing the whole excavation, the head may possibly turn within the blades and become converted into an antero-posterior position; but it may also happen that this spontaneous version does not take place at all. If, therefore, the obstacle exists at the superior strait alone, and the uterine forces appear adequate to the prompt termination of the labor, we may withdraw the instrument and trust the rest to nature. But in other cases I think it would be proper to endeavor to transfer the blades to the sides of the head, or even to reapply them in accordance with the precepts before given for their application at the inferior strait. It is evident that, with the assistance of Baumers' forceps, the latter inconvenience would be avoided.

§ 4. Application of the Forceps in the Face Positions.

When the face presents, an application of the forceps may become necessary, either when the head has descended to the inferior strait, when it is engaged at the superior one, or when it is still movable above the brim of the pelvis.

1. *When the Head is at the Inferior Strait.*—If both the head and the pelvis retain their usual size, the face can only reach the perineal floor by descending with the chin directly forwards, or nearly so. (See *Mechanism of Face Positions.*) As the application of the forceps in these three different cases does not differ in the least from that described in the corresponding vertex positions, we deem it useless to pass over the same ground.

But the face, without having reached the perineal strait, may, nevertheless, be low down in the excavation; and the process of rotation, whereby the chin should be brought under the pubic arch in all cases, may not have commenced at all, or it may either be partially accomplished or fully completed. We might, therefore, have to apply the forceps in a mento-anterior or pubic, in a left or a right anterior mento-iliac, or in a left or a right transverse mento-iliac position.

Since it is absolutely necessary, in the face positions, for the chin to come under the pubic arch, the instrument is always to be applied with its concave edges looking towards the chin, taking care to introduce the posterior blade first.

By way of example, let us suppose that the face is situated in a left anterior mento-iliac position, and is low down in the excavation. Here, in conformity with the directions before given, the male blade will be placed posteriorly and to the left, near the left sacro-iliac articulation, and the female blade just behind the right anterior arch of the pelvis; when locked, the concave edges of the blades will look forwards and to the left. The rotation is then effected from behind forwards, and from left to right, so as to bring the chin behind the symphysis; and when this is accomplished, we draw directly forwards, and a little downwards, in order to free this part from the pubic arch; and then, after having secured its delivery, the handles are gradually carried up, at the same time drawing moderately, with a view of promoting the flexion and disengagement of the head.

2. *When the Head is at the Superior Strait.*—The face may be found in every possible relation with the different parts of this strait. Should the

chin correspond to any portion of its anterior half, the forceps may be applied without any particular difficulty; but if the face is in a mento-posterior

FIG. 141

Application of the forceps in the left anterior mento-iliac position.

FIG. 142.

Application of the forceps in the mento posterior position.

position, the pelvic or cephalic version, whenever possible, ought to be chosen in preference. For when the forceps is once applied, the object would evidently be to bring the chin behind the symphysis pubis; but as the body is probably held motionless by the contraction of the womb, it will not participate in the rotation of the head produced by the instrument, and hence luxation would occur at the joint between the first and second cervical vertebræ, which does not admit of movement beyond a quarter of a circle.

When the face is situated in a mento-posterior position, and has descended so far into the excavation that it is altogether impossible to return it above the superior strait with a view of performing the cephalic or the pelvic version, the use of the forceps becomes a matter of necessity. Under such circumstances, we should therefore apply them for the purpose of relieving the mother from her threatened danger; not, as we observed in the preceding editions, to bring the chin in front, but merely with the intention of flexing the head, and converting the face position into one of the vertex. To accomplish this, the blades are to be placed on the sides of the head, and in operating, the handles should be depressed as far backwards as possible, so as to act chiefly on the vertex, until the occiput is brought down under the pubic arch; if the chin were directly posterior, such a movement of rotation might be given to the head, prior to any tractive effort, as would carry the former into the great sciatic notch on one side or the other. This appeared to me the most feasible operation some years ago. I observed, however, that, according to M Mascarel, *Thesis*, page 84,[1] M. P. Dubois has pro

posed another; or rather he inquires whether it would not be possible to convert a mento-posterior into a mento-anterior position. It may be objected, he continues, that, if the head is forced to undergo too great a rotation, and the body does not turn simultaneously, the child's neck would be twisted: but as the only thing to be done, if this will not answer, is to perforate the cranium, and consequently to sacrifice the infant, he considers the former measure preferable; more especially as the chin might escape under the ischio-pubic ramus, without the necessity of getting it exactly beneath the pubic arch. I know that this method has sometimes succeeded, and M. Blot informed me quite recently, that he had delivered three times, by bringing the chin in front.

It may be that the shape of the instrument is, in this case, one of the principal causes of the difficulty met with, and that the use of a straight forceps would render the manœuvre much easier. This advice, given I believe by M. P. Dubois, deserves to be taken into consideration.

In 1850, M. Danyau read a paper before the Academy, in which he gave preference to this operation; he recommended, however, that, unless the straight forceps are used, the curvature of the edges should be turned toward the chin, as was practised by Campion. He claims to have succeeded several times, and even to have delivered children alive.

Still more recently, M. Danyau and myself succeeded in bringing the chin in front by the use of the forceps, the child remaining alive. In this case, it is true that the face had begun to rotate, so that when the instrument was applied it was quite near the right extremity of the transverse diameter. Facts of this nature have so accumulated, of late years especially, that they can no longer be regarded as exceptional; and if the chin corresponds exactly with the sacro-iliac symphysis, especially if it has already undergone a slight movement forward, there is reasonable ground to hope that the spontaneous rotation thus begun will second that impressed by the forceps upon the chin, and the extraction be accomplished with the chin to the pubis, the body, in consequence of the contractions of the womb, having partaken of the motion communicated by the instrument to the head.

It must, however, be remembered that, in direct mento-posterior positions, this excessive rotation is likely to kill the child; and such a case I have already quoted. Besides this, it must especially be borne in mind that, however skilful the operator, it has often proved impossible. Messrs. Dubois, Danyau, Cazeaux, and many others have failed; and Smellie himself, who long since advised bringing the chin forward, was often unable to succeed. On consulting the voluminous record of observations published by Smellie, I have found but four cases in which the face was deeply engaged in the pelvic cavity in a mento-posterior position. In all these cases, he first tried to push up the head, failing in which he applied the forceps. Now in these four cases, he only once succeeded in bringing the chin forward; in one other, he was only able to flex the head with the instrument and disengage the vertex and occiput, the first beneath the pubis; in the remaining two cases, he was obliged to use the crotchet. The latter course was also pursued in a case furnished him by one of his old pupils. Thus,

of five cases, did but one permit of rotation forward; it being impossible in all the others.

Are we prepared to say that after rotation forward has failed, craniotomy alone remains? I think not, but believe it right first to endeavor to flex the head by means of the forceps. By so doing I extracted a living child Smellie also succeeded, after vainly trying to bring the chin forward; and similar cases are to be found in the medical journals. It ought, therefore, to be attempted before having recourse to craniotomy.

In estimating the value of the various modes of procedure which have been mentioned for effecting delivery in these difficult cases, we must not be too exclusive; for experience shows that the plan which succeeds in one case fails in another, without our being able fully to account for the difference; often, indeed, after having tried them all fruitlessly, it is necessary to have recourse to craniotomy.

Especially do I think it necessary to a proper estimate of the utility of each, that great regard should be had, at the time of operating, to the exact relation of the chin with the posterior plane, to the energy of the contractions, and to the tendency which the head may exhibit to perform its rotatory movement. An almost direct mento-posterior position, immobility of the head, and continuance in that position after a long labor, as also the weakening of the pains so often consequent upon great prolongation of labor, are conditions evidently opposed to artificial rotation.

In short, apply the forceps and attempt the rotation, making the efforts coincide with the contractions of the womb; if unsuccessful, try to flex the head; should this fail, perform craniotomy.

3. *When the face is still above the superior strait*, an application of the forceps is only to be attempted when the pelvic version is altogether impossible. In fact, it is well known that the face is then usually found in a transverse position. Besides, as previously stated, when the head is so high up, the blades are necessarily applied along the sides of the pelvis; consequently, one of them would come into contact with the vertex, the other with the neck, and the pressure made on this latter part would most assuredly compromise the life of the child. We were, therefore, right in saying that the forceps ought only to be used as an extreme measure, and that before using it, unless Baumers' forceps are tried, an attempt should be made to convert the face position into one of the vertex by the cephalic version, and then apply the forceps on the head in this rectified position.

§ 5. When the Head remains behind after the Body is expelled.

When the head is retained in the mother's parts, after a natural delivery by the breech, or after the pelvic version, an application of the forceps is rarely indispensable, for the hand alone is usually sufficient to effect the delivery; more particularly in those cases where an extension of the head is the sole cause of difficulty. But when the manual operation has failed, or the base of the cranium is arrested by a contraction of the pelvis, the forceps may certainly be very useful, Madame Lachapelle to the contrary notwithstanding.

Whenever an application of the instrument is decided upon, the rules for operating are nearly the same as in the vertex positions; here, also, the blades are placed as nearly as possible on the sides of the head, having their concave edges always directed towards the part that is to come under the pubic arch, &c. We may further add, that it should be entered along the sternal plane of the child, as also, that the body is to be supported and carried towards that side where the occiput is situated, *i. e.* directly forward and upward in the occipito-pubic positions, forward and to the left in the left anterior occipito-iliac positions, &c., &c.

The blades having been introduced in the usual manner, we are next, as a general rule, to attempt the disengagement of the head by a movement of flexion, having the nape of the neck as its centre; which is situated at times under the symphysis pubis, and at others at the perineal commissure.

In one case only would the accoucheur be warranted in entering the forceps along the dorsal plane of the child, and freeing the head by a process of rotation. We mean, where the face is above, the occiput being behind; but this manœuvre, which was recommended by Madame Lachapelle, does not always succeed; for other practitioners are not so fortunate as that skilful midwife in turning the face into the hollow of the sacrum. We rather believe, with M. Velpeau, that, relying on the result of the cases reported by Eckard and Michaelis, it might be possible, by means of well-directed tractions, to free the occiput at the anterior perineal commissure, after which the delivery of the head would be completed by its extension.

Fig. 143.

Application of the forceps where the head is retained after the delivery of the body.

But a much more difficult case may be met with in consequence of an arrest of the head above the superior strait; whether arising from an unusual extension, incapable of being remedied by Madame Lachapelle's manœuvre, or from a contraction of the pelvis, too inconsiderable of itself to require the use of the forceps. Both Smellie and Baudelocque, who were as skilful as fortunate, have succeeded in its application under such circumstances; but, notwithstanding the great authority of their names, cases of this kind may well be dreaded when such a man as Dewees always failed in the operation! In fact, what a series of difficulties are here met with! Thus, not speak of the obstacle to the operation caused by the trunk filling up the vulvar orifice, we must remark: 1. That, when the head is lodged transversely with regard to the pelvis, as frequently happens, the forward inclination of the upper strait makes it impossible to apply the blades on the sides of the head; 2. That the vertical diameter of the head will necessarily be placed in the direction of the axis of the blades, and that

the latter will consequently be applied upon the two extremities of a long diameter, — a circumstance tending strongly to defeat the operation; 3. That on account of the elevation and position of the head, it is often imperfectly grasped by the instrument, which is liable, upon the first tractions, to slip and wound the parts of the mother. It is, however, the extreme resource, and must be attempted whenever tractions, as strong as are compatible with the life of the child, have proved unavailing.

The rules for its accomplishment are very simple; namely, to carry the trunk towards the part corresponding with the occiput; to depress the chin as much as possible, with a view of diminishing the extension of the head; to enter the blades on the side of the pelvis; and, lastly, to operate, as far as practicable, in the direction of the pelvic axes.

Should the base of the cranium present after the accidental or designed separation of the head from the body, it would be proper, provided the pelvis were well formed, to apply the forceps, after having taken the precaution of placing the head in a proper position; that is, with the smallest diameters corresponding with the plane of the pelvis, and the occipito-mental diameter with the direction of its axis. Should the deformity be too great, the embryotomy forceps will be the only resource. (See *Craniotomy.*)

§ 6. General Considerations of the Employment of the Forceps.

Although an exceedingly useful instrument when employed by skilful hands in proper cases, the forceps, by being badly directed or improperly applied in those in which it is not indicated, may give rise to the most serious disorders. It is particularly important, therefore, in closing this article, to point out the cases in which it may be advantageously employed. Besides, this short review will serve to illustrate the precepts just given, and render its mode of action more intelligible.

The forceps has been recommended: 1st. In cases of irregular or inclined vertex and face positions, which are neither corrected spontaneously nor can be by the unaided hand. 2d. Where a disproportion exists between the pelvic dimensions and the size of the head, whether dependent on an excessive volume of the latter or a contraction of the former. 3d. Where any accident, serious enough to compromise the life of the mother or child, occurs during the labor, which is not remediable by version. 4th. Lastly, where the head has descended to the pelvic floor, and is there arrested either by the resistance of the soft parts or by the shortness of the cord.

1. *Inclined Vertex or Face Positions.* — As heretofore stated, we consider an application of the forceps preferable to the use of the vectis or levers in these cases, after the inefficiency of the natural powers has been fully determined by a delay of seven or eight hours. The retraction of the uterus would render version too difficult. In fact, we believe that a prompt delivery is equally demanded for the benefit of the mother and the child, and that the forceps alone can accomplish this result. Moreover, as the inclined lateral or parietal positions are nearly always transverse, it is unnecessary to add, after what has been elsewhere said, that the blades are to be entered on the sides of the pelvis; and that, as the head descends into the excavation, it will probably undergo rotation, whereby it will be con-

verted into an antero-posterior position.[1] By proceeding in this manner, we will avoid, according to Dugès, the difficulties of a direct antero-posterior introduction as regards the pelvis, and the dangers to the fœtus from a biparietal application; for it must be obvious that, if the inclination were considerable, one of the blades would bruise the upper part of the neck.

2. *Contractions of the Pelvis.* — The ultimate limit to which we restricted the use of the forceps, was three inches; because any reduction we could hope to obtain in the diameters of the head beyond that, would not, as a general thing, be great enough to permit it to pass through the contracted diameter of the pelvis. In truth, the enlarged experience of Baudelocque has proved that, when the forceps is applied in the direction of the biparietal diameter, the greatest reduction attainable, without compromising the child's life, is not more than half an inch. Now, this diameter, on a well-formed head, averages from three and a half to three and three-quarter inches, and even supposing that we can reduce it half an inch, there will still be left three inches at the least.

Certain practitioners, having observed that the head became gradually moulded to the shape and dimensions of the pelvic cavity, by the efforts of the womb alone, in some cases in which the pelvis was contracted to less than three inches, have therefore imagined that the resources of art could accomplish what nature alone sometimes effects; that by the forceps a similar reduction in the diameters of the head might be obtained; and consequently, that the instrument could be usefully applied when the contracted diameters are even less than three inches. But they have instituted a comparison between two forces that are wholly dissimilar. Indeed there can be no doubt that the expulsory efforts of the womb have succeeded in forcing the head through the pelvis where the smallest diameter did not exceed two and three-quarter inches; but this result was only effected after a tedious labor of thirty, or forty, or even sixty hours; and where the slow and gradual compression, to which the head was then subjected, enabled the brain to accommodate itself thereto by degrees. On the contrary, the reduction obtained by the forceps is produced by a force that does not extend beyond half an hour or an hour at the most. Now, everybody knows that a tumor, whose development extends over a period of several years, may exist within the cranial cavity without giving rise to any serious disturbance, whilst a little drop of blood, suddenly effused, brings on paralysis at once. Consequently, the pressure made by the forceps may kill the child by its

[1] This phenomenon occurred in a lady, in Rue St Paul, to whom I was called by Dr. Ducros, about seven o'clock in the evening. The membranes had been ruptured since eight A. M.; the head was situated in a transverse occipito-iliac position, and was inclined on its anterior parietal region; it had not made the least progress since morning, and was so inconsiderably engaged at the superior strait, that I was forced to introduce nearly the whole hand for the purpose of ascertaining the position: the waters had escaped, and I attempted in vain to effect a reduction; but an application of the forceps, made in the manner above indicated, was attended by the happiest results.

The head descended, and rotated within the blades, and in less than five minutes the child was born living.

The lying-in exhibited nothing unusual.

sudden action, notwithstanding the reduction is absolutely less than what nature herself sometimes produces after several hours of suffering.

But when the pelvic diameters exceed three inches, the forceps may prove very useful; though I am induced to believe that the character of its action has been misunderstood, by supposing that it is to serve both as an instrument of traction and as one calculated to reduce the dimensions of the head by its pressure. Let it be understood that the forceps merely acts here as an instrument of traction.

In fact, the contraction usually exists at the superior strait, where it is particularly apt to affect the sacro-pubic diameter; and as the head always has a tendency to present its long diameters to those of the pelvis, when retained above, it is generally found in a transverse or an oblique position (more frequently the former). Its biparietal diameter will, therefore, correspond to the smallest one of the strait, and of course the blades of the forceps should be applied in the direction of this diameter; but we have shown that such an application is not possible in any case, and this impossibility is still more evident when contraction exists. For, as Dr. Collins observes, if the sacro-pubic diameter amounts to but three inches, it would be impossible to apply an instrument, the interval between whose blades, when closed, is from three and a half to three and three-quarter inches.

The forceps will therefore have to be applied laterally; but it is evident that the pressure exerted by it will bear upon the occipito-frontal diameter. Now, although the experiments of Baudelocque may have proved that the head, when flattened in one direction, is not very sensibly enlarged in another, it cannot be supposed that a reduction effected in the occipito-frontal diameter would at the same time diminish the biparietal one, which is perpendicular to it. How, then, does the forceps act? Simply by its tractive power, which, conjoined with the uterine contractions, induces the head to engage in the excavation; when, of course, as the parietal protuberances correspond with the anterior posterior diameter, the biparietal one becomes compressed between the pubis and sacrum; the pelvis itself acting here as the compressory agent, and not the forceps, which latter merely facilitates the process by its tractions. The pressure exerted by the instrument would certainly be more hurtful than useful, by preventing whatever elongation the occipito-frontal diameter is capable of receiving during the forcible reduction of the biparietal one. This view of the action of the forceps has at least the advantage of demonstrating the uselessness, if not the danger, of the powerful efforts sometimes resorted to by certain accoucheurs for the purpose of compressing the head, and reducing its size; for when the head is well grasped by the instrument, all that is requisite is to tighten the latter enough to prevent it from slipping during the operation. If the forceps can ever be used as a means of reduction, it is only when the head is arrested by a shortening of the bis-ischiatic diameter.

The limits just assigned to the application of the forceps, are the consequence of experiments upon the dead body, and of the most frequently observed cases; but we shall have occasion to prove hereafter that they cannot be regarded as absolute. When the smallest diameter of the contracted pelvis is less than three inches, we are still almost obliged to try the

forceps before having recourse to craniotomy or symphyseotomy (see *Symphyseotomy*), and it has several times been the means of extracting a living child through a diameter of but two and three-quarter inches, for example.

But are the forceps the only resource left before having recourse to a bloody operation in cases of contracted pelvis? We long thought that it was, and, notwithstanding the impression made upon our mind by the perusal of the observations of Madame Lachapelle, we shared on this important practical point the opinion of the majority of French accoucheurs, and proscribed pelvic version in cases of contracted pelvis, except in the oblique oval variety, in which it was admitted by all to have undoubted advantages.

The recent publication of Drs. Simpson and Radfort led us to a fresh examination of the question.

"On reading cases of contraction of the pelvis," says Dr. Simpson, "I was struck with the fact, that the labor in certain malformed females was much easier and more fortunate when the child had presented by the feet than when the head was the first to offer. In several cases even, which would have required craniotomy, the presentation of the feet or pelvic version enabled me to effect the delivery in a succeeding pregnancy. Five observations of this kind are recorded by Smellie."

"According to my tables," says Madame Lachapelle, "of fifteen children delivered by the forceps, on account of contracted pelvis, seven lived, and eight perished; whilst of twenty-five delivered by the feet, fifteen survived." The proportion of success is, therefore, three-fifths for version, and rather less than one-half for the forceps. "These fortunate results of version," adds the illustrious midwife, "are doubtless due to the greater facility with which we are able, whilst drawing upon the pelvic extremity, so to direct the head of the fœtus as to place its transverse diameter in correspondence with the shortened antero-posterior one. When, on the contrary, the head presents first, it is, in fact, generally situated transversely; but it may possibly occupy much more unfavorable positions, and those, too, of a kind which the forceps is incapable of altering."

Supposing the head to be situated transversely above the shortened sacro-pubic diameter, would it traverse the passage with any more ease if presenting the top of the head, than when, after the extraction or spontaneous expulsion of the body, the base of the cranium is presented to the shortened diameter? Here, theory seems to be quite in accordance with the above-mentioned facts. The head, regarded as a whole, represents a cone, whose base is the biparietal diameter, amounting to from three and a half to three and three quarter inches, and the top of the head by the bimastoid diameter, amounting to but from three to three and a quarter inches. This latter diameter is irreducible, whilst the former is susceptible, under the influence of pressure applied for a longer or shorter time, of being shortened to the extent of three-eighths, or even five-eighths of an inch. Now, when the top of the head presents first, the base of the cone which it represents is brought in relation with a shorter diameter than its own, and all the efforts of the womb, as well as the tractions of the forceps, can have but the single result of flattening the vault of the cranium against the opening of the pelvis, and consequently of increasing, instead of diminishing, the biparietal

diameter. If, on the contrary, we suppose the cone represented by the head to engage by its point, that is to say, by its bimastoid diameter, the tractions upon the body of the child might have the following effects: namely, if the shortened pelvic diameter presents at least from two and three quarters to three and a quarter inches, it will present no serious obstacle to the engagement of the bimastoid diameter, and from that time, the compression upon the sides of the parietal protuberances, produced by the resisting symphysis pubis and sacro-vertebral angle, tends to force them nearer together, that is to say, to shorten the biparietal diameter, and the head drawn down by the accoucheur will engage in the contracted part of the pelvis like a wedge, the base of which is compressible. In short, the resistance of the bones of the pelvis in the presentation of the top of the head, tends to lessen the occipito-frontal or occipito-mental diameter, whilst in foot presentations, it tends to diminish the transverse diameter, that is to say, the only one which it is important should be reduced. (Simpson.)

A greatly prolonged labor ought, doubtless, be regarded as one of the most dangerous circumstances affecting the welfare of both mother and child, for the lives of both are hazarded in proportion to the lengthening out of the expulsive stage; now, according to Dr. Simpson, version affords the immense advantage of enabling us to terminate the labor more quickly. What, indeed, is the course generally pursued when it is proposed to apply the forceps in these cases of contraction? It is evidently, to wait before acting, in order to determine the incapacity of the uterine efforts, and it is not until after five, six, or eight hours of expectation, that the instrument is used. In the meanwhile, the head is compressed powerfully, and the maternal organs are so seriously contused as to expose them to gangrene, or, at least, to those inflammations of the uterus or of the cellular tissue of the pelvis, so dangerous during the lying-in. On the contrary, when turning is intended, the most favorable moment can be chosen in many cases, which is immediately after the membranes are ruptured and the neck completely dilated. The term of expectation would be still longer in presence of a pelvis so contracted as to require embryotomy; for, unless the fœtus is found to be dead, the operation is deferred until it shall have perished, or at least until the labor shall have lasted so long as to render its viability exceedingly doubtful.

If regard be had only to the interests of the mother, version, as affording opportunity to act immediately after the membranes are ruptured, should therefore be preferred; but is the case the same as respects the fœtus? If we compare the results of podalic version with those of embryotomy, the reply is ready, for the facts mentioned by Madame Lachapelle, and some authors, afford us at least the hope of sometimes saving the child by turning, whilst its death is the inevitable consequence of any other operation. But do not the forceps, within the rational limits which we have fixed for their employment, afford greater chances to the fœtus than the extraction by the feet? Madame Lachapelle and Drs. Radfort and Simpson do not hesitate to declare for the turning. Notwithstanding the facts collected by the illustrious midwife, and whilst admitting with the English accoucheurs, that the compression is less dangerous to the fœtus when exerted on the

sides of the head than when its tendency is to shorten the occipito-frontal diameter, we confess that we cannot share their preference when the top of the head presents in a favorable position. The arrest of the base of the cranium above the contraction, the possible extension of the head, the stretching of the cervical region to which the tractions made on the body necessarily expose it, the possible compression of the umbilical cord during the time occupied in the extraction of the child, are, indeed, very unfavorable circumstances for the latter, and, unfortunately, greatly to be feared during version. But when, with a shortened diameter of three and a quarter inches, there coincides an unfavorable presentation, as those of the face or of the trunk, and when, before the application of the forceps, it is first necessary to perform the cephalic version; or when, the top of the head presenting, it is so situated that its longitudinal diameter corresponds to the contracted one, we are of their opinion, and prefer version to the use of the instrument.

When the antero-posterior diameter of the pelvis amounts to but from two and three-quarters to three and a quarter inches, and the child, being still alive, is placed in the conditions just mentioned, we also think that version should be preferred.

If, after several fruitless attempts made with the forceps upon a favorably situated head, the heart is heard to beat distinctly and regularly, we should, if the pelvis has at least two and three-quarter inches, attempt the pelvic version before resorting to craniotomy.

We would add, with Madame Lachapelle, that version is also preferable to the use of the instrument, when the inferior strait is contracted transversely, and the pubic arch is narrow and angular. When, in fact, the head is the first to be delivered, the occiput appears first beneath the pubis, and its disengagement under these circumstances is very difficult, and sometimes even impossible. When, on the contrary, the extraction takes place by the feet, the occiput places itself behind the pubis, the forehead is the first to appear in front of the perineum, and only the *back of the neck* engages in the arch of the pubis.

[Our colleague, M. Joulin, expresses a much more positive opinion. He insists that turning ought to be rejected and the forceps preferred whenever they can be applied, except in cases of obliquely deformed pelvis. In his paper (*On the Forceps and Version in Contractions of the Pelvis*) are recorded experiments of undoubted value, made upon the dead body; yet it was a great mistake that, in an account in other respects very well prepared, M. Joulin should have supposed the previous editions of this work (Cazeaux, 1858) to contain inconsistencies in reference to the subject under consideration. To know that the charge is unfounded, it will only be necessary to consult the full text in order to ascertain its true meaning. To it we refer the reader who would judge for himself. The apparent contradiction is really but an expression of reserve in the judgment given.]

To recapitulate: when the pelvis has at least two and three-quarter inches in its sacro-pubic diameter, the forceps should be used if the top of the head presents in a transverse position. The pelvic version should be preferred: 1, in direct antero-posterior positions; 2, in inclined or irregular positions of the top of the head; 3, in face and trunk presentations; 4, in contractions

of the infer or strait attended with narrowing of the sub-pubic arch. It were useless to recall the important distinction which we have established for the oblique oval pelves, in which version is the rule.

3. *Accidents.*— It is only necessary to recall the conditions in which version is practicable, to show the part the forceps may play in those accidents that require a speedy termination of the labor. We need not mention the dilatation or dilatability of the os uteri, for this is indispensable to both operations. Should a completion of the delivery be deemed imperative, when the head has cleared the cervix, or is low down in the excavation, we would apply the forceps; but, on the contrary, if it be but little or not at all engaged at the superior strait, version would be preferable, unless the pelvis was very narrow, or the womb was so firmly contracted as to render an introduction of the hand unusually painful, or even impossible.

4. *The Resistance of the Perineal Muscles* is one of the most common reasons for resorting to the instrument; for nine out of every ten applications of the forceps are made for the purpose of extracting the head, which has been detained at the pelvic floor for four, five, six, or seven hours; indeed, if the measures recommended on page 678 have proved ineffectual, this is our only resource. But, even here, it is possible that obstetricians have been in error with regard to its modus operandi, since every one, who, like myself, has frequently had occasion to apply it, must have been struck with the fact of how little effort is required, under such circumstances, to effect the delivery of the head. For, where this part has been retained at the same point for seven or eight hours, notwithstanding the most energetic contractions of the organ, and all the uterine forces have been expended on an apparently insurmountable obstacle, the accoucheur, in resorting to his instrument, may anticipate the necessity of using some considerable force; and yet, as soon as a few slight tractions are made, this great resistance seems to give way at once, the uterine contractions that were so long ineffectual are henceforth adequate, and the patient soon expels the head and forceps together. Far different would be the result, if the arrest of the head were altogether dependent on an over-resistant perineum; for the exertion requisite in those cases, where this part has been rendered less extensible by abnormal bands or cicatrices, is well known. Doubtless, this resistance from the pelvic floor is the first source, but it is far from being the whole cause of the difficulty.

In my opinion, the following is the true state of the case: when the head, urged on by the uterine contractions, reaches the floor of the pelvis, it is already in a state of flexion, which must certainly increase as the pains become stronger, and the perineum more resistant; for, being placed between two opposite forces, it will necessarily be flexed on the chest to the greatest possible extent. Now, it is this excessive flexion that constitutes the most serious difficulty, for, in this position, the spinal column abuts directly on the occiput, and every expulsive effort transmitted by it has a tendency to depress the latter, and to flex the head: but here its extension can alone effect a delivery. The question recurs, how then does the forceps operate? I answer, in a very simple manner: by the first tractions it extends the head, changing this part to a more favorable position relatively to the spine, and

thus restores the efficacy of the uterine contractions, which latter are quite sufficient for the subsequent completion of the delivery.

Hence, the reader will understand that, although the perineal resistance is, without any doubt, the original cause of the arrest of the head, yet, in a vast majority of cases, it merely acts by producing an exaggerated flexion; and that, as soon as this is created, it alone constitutes the whole difficulty; a proof of which is satisfactorily afforded by the ease and rapidity of the termination of the labor, after the first moderate tractions made by the instrument have effected a partial extension.

5. Lastly, it has been shown how a shortening of the cord may become a cause of dystocia. Where this happens, the forceps is a hazardous resource, that ought to be avoided; but the real source of the delay is generally unknown, and, even if it were not, I know of nothing better to be done, if the head is low down in the excavation.

The period of labor for applying the forceps varies with the cause that demands its use. When any accident whatever renders it advisable to produce a speedy delivery, and the forceps be deemed appropriate, the time for operating will be judged of by the danger of the accident itself; for we are evidently to interfere as soon as there is reason to fear that the life of either the mother or child is involved. When the head is arrested above the superior strait by a contracted pelvis, we might wait in ordinary cases, as elsewhere stated, for six, seven, or even eight hours after the membranes are ruptured and the os uteri is fully dilated; but a longer delay would expose both mother and child to the most serious hazard. Again, when the arrest of the head is dependent on the resistance of the soft parts, the pressure thereby created on the vaginal walls and sometimes even upon the parietes of the womb, might eventually determine a gangrene of those parts, and render the patient liable to the vesical and recto-vaginal fistulas, which often result in consequence. Besides which, the fœtus, being subjected for a long time to compression, may suffer from it, and from the disorder thereby created in the omphalo-placental circulation; and the uterus, having exhausted its energy against resistances which it cannot overcome, falls into a state of inertia that continues after the delivery, and becomes then a source of hemorrhage; and, lastly, the inflammation of the womb or vaginal walls that occasionally takes place, may extend to the peritoneum after, or even during the labor, and speedily prove fatal. All these dangers are easily obviated by the proper application of the forceps; and though, on the one hand, the abuse of the instrument, by employing it too early, as some practitioners are in the habit of doing, is to be avoided, yet, on the other, we must not virtually interdict its use by trusting too long to the powers of nature. We must again allude to what was previously stated in regard to the importance of observing the stage of the labor at which the delay occurs; thus the time that has elapsed prior to the rupture of the membranes, can have but little influence on the mother's condition, and none on that of the child, so that, even where the labor has lasted from thirty to thirty-six hours, there is often nothing to be done; though if the head were low down in the excavation, and it had made no progress for seven or eight hours, the forceps ought to be applied. But this rule, which is applicable to most cases, admits

of some exceptions; and it would seem useless to add that the state of the patient's health, the strength or feebleness of the uterine contractions, the slowness and intermission, or the regularity of the fœtal pulsations, &c., must influence the time of its application. The accoucheur would be justly liable to censure for not acting soon enough, and equally so for recurring too early to the use of instruments.

Statistics, and General View of the Operation. — We find the same difficulty in forming an exact idea of the frequency of the cases requiring the application of the forceps, as we did of the cases demanding version, for they vary much in different countries, and even in the practice of accoucheurs of the same locality. Thus, on consulting the statistics collected by Churchill, we find for England, 120 forceps cases in 42,196 labors, or about 1 in 351; whilst in France, the instrument has been used 277 times in 44,776 labors, or about 1 in 162; and in Germany, 1702 times in 261,224 labors, or about 1 in 153.

It is still more difficult correctly to estimate the danger of the operation to the mother and child, for the statistics generally represent only the number of mothers and children who perished, without stating the cause requiring the intervention of art, and, consequently, leaving us uninformed as to the probable danger of the operation in any given case. Thus, the risks to which the mother and child are subjected when the use of the forceps is demanded only by the resistance of the soft parts, is not comparable to that which threatens them when the head is arrested by a contraction of the pelvis. The length of time which elapses between the discharge of the waters and the intervention of art, necessarily influences greatly the result of the operation: now, with the exception of Dr. Collins, whose statistics, though unfortunately too limited, prove that the mortality is greater in proportion to the lateness of the operation, very few authors have noted this particular point.[1]

There can be no doubt that the use of the forceps increases the dangers of the delivery.[2] Besides its being always prejudicial to interfere with the operations of nature when they are going on regularly, the application of the forceps, though apparently of the simplest character, may prove dangerous to the mother, and especially to the fœtus. The too rapid depletion of the uterus exposes the woman to hemorrhage from inertia. The dilatation of the soft parts takes place with far less regularity when the head is extracted by the forceps, and the perineum is, therefore, much more liable to laceration, however carefully the tractions are performed. Finally, I shall not speak of the lesions of the cervix and of the perforation of the vagina, since it is always possible to avoid them by conforming to the precepts already given.

[1] Dr. Collins gives the following as regards the mothers. When the labor was terminated in 24 hours, but one woman died out of 14; between the 24th and 30th hour, there was one death for 6 cases; between the 37th and 48th, one death in 4, and beyond 48, one death in 2 cases.

[2] In natural labors, the mortality was, for the mothers, 1 in 346, and for the children, 1 in 31; in deliveries by the forceps, it was, for the mothers, 1 in 25, and for children, 1 in 43.

Therefore, the instrument should be had recourse to only when the insufficiency of the powers of nature shall have been well ascertained, and we are convinced that a longer expectation would be injurious to the mother or to the child.

The posterior position of the head, when the vertex presents, also adds to the difficulties and danger of the operation. Especially when the occiput is directly behind, or behind and to the left, is the operation more laborious. I have mentioned a case of direct posterior position in which I was obliged to bring the occiput forward (page 974, note). In two other cases of left posterior diagonal position, the head was delivered only by the strongest exertions. The occiput in these cases pressed so strongly upon the sciatic plexus, that both the patients suffered, for a long time after, great pain in the course of the sciatic nerve, and one was unable to walk for more than a year.

On the other hand, the compression of the child's head by the instrument may be prejudicial to its health or even to its life, and we have to point out as possible occurrences, cerebral effusions, fractures, and depressions of the bones of the skull, exophthalmia, contusion, laceration, and separation of the scalp, compression of the umbilical cord between the head and the blade of the forceps, and, lastly, paralysis of the facial nerve, on which we shall make some remarks.

Quite recently, M. Landousy has called attention to the facial paralysis of new-born children, that often follows an application of the forceps; and M. P. Dubois has also alluded to the same fact in his lectures. This palsy, which affects only one side of the face, is caused by the pressure of the blade on the seventh pair of nerves. Owing to the nearly total absence of the mastoid process, and the defective development of the auditory canal, such a compression of the facial nerve just as it escapes from the stylo-mastoid foramen may occur very easily. The affection is easily recognized immediately after birth, by the following circumstances: the commissure of the lips is drawn out of place; the nostril is neither so dilated nor so movable as its fellow of the opposite side; the eyelids are open, while those on the sound side are closed; the whole side of the face is distorted, and this deformity, heightened by the infant's cries, gives it a very peculiar expression. As soon as the crying is over, the deformity is so slight as scarcely to be noticed, if the eye on the sound side happens to be open; but when the child cries again, the want of symmetry in the features is once more observable. This difference in the phenomena of the disease, dependent on the condition of repose or agitation of the face, is much better marked than it is in the facial hemiplegia of adults. The difference is particularly striking just before it cries, for its face then exhibits alternations of rest and excitement such as those just described. In the course of a week or ten days these symptoms nearly all disappear, and the equilibrium between the two sides is gradually restored. When the compression of the nerve has been moderate, the hemiplegia does not last so long, and occasionally disappears in a few hours; but in other instances it may persist for a month or two. Hitherto, this affection has never terminated in death, having always passed off, even where no active medication has been employed.

The only precautions necessary in such cases, are to protect the eye from the light; and, when sucking is interfered with by the paralysis, as it occasionally is, to find a nurse having a well-formed nipple.

CHAPTER V.

OF THE VECTIS.[1]

THE vectis (or lever), which Burns proposed calling the *tractor*, was formerly much used, though, at the present day, it is scarcely ever resorted to, since, in nearly all the cases in which it has been recommended, the forceps may be advantageously substituted. It was employed to effect the correction of the head in cases of inclined vertex presentations, to depress the occiput in face positions, to force the head to descend, and to free it from the genital organs. It was probably devised at about the same time as the forceps, and if Roonhuysen was not really the inventor, he was, at any rate, one of the first to use it, and through his example it soon acquired a great reputation. But the vectis has undergone numerous modifications since it became public. The one now in use resembles a branch of the forceps; the blade is provided with a fenestra, and is curved on one side so as to adapt itself to the convexity of the child's head; being terminated below by a long flat stem, which becomes narrower and rounded, so as to fit in a wooden handle, which latter is either continued out in the same line, or else is slightly bent in the opposite direction from the blade.

We agree with Dr. Coppée, that if the lever is to be used at the superior strait, it ought to have a very slight curvature, for if it were otherwise constructed, the difficulties which would be met with in its application might be charged to the method when, in fact, they were due to the form of the instrument.

[The lever is to be introduced in the same way nearly as a blade of the forceps. The bladder ought first to be emptied, a precaution even more necessary than when the forceps is used. The woman ought to lie across the bed, and very horizontally, the latter position being regarded by the advocates of the vectis as highly important.

The instrument being warmed and greased, the hand or a few fingers are to be passed into the vagina, in order to guide the blade to the head of the child. The operator takes the handle of the instrument in the other hand and passes the blade into the vulva. The blade may be placed at once in front, just where it is intended to apply it, though we think that it would be better to observe the same plan as with a blade of the forceps, that is, first to direct it backward until it reaches the sacro-sciatic ligament, and then give to it a spiral motion which brings it more or less toward the front according to circumstances. When properly applied, the vectis will always be found at last behind the most anterior segment of the pelvis and in relation with the body of the pubis, for it ought always to act upon the head from before backward.

It is of the first importance to be sure of the presentation and position, inasmuch as the instrument ought never to be applied except to the bony parts of the head, as the occiput, temple, or mastoid apophysis, the occiput or mastoid region being the parts which offer the greatest advantage.

[1] This description of the vectis is allowed to remain as a mere act of old traditions. No one ever uses the instrument at the present day.—P. F. M.

The choice of the side of the pelvis upon which the vectis shall be applied will depend more especially upon the position of the occiput and the movements which the accoucheur wishes to impress upon the head, in accordance with the mechanism of natural labor. In anterior and transverse occipito-iliac positions, for example, the blade ought always to be passed to that side of the pelvis where the occiput is situated, so that it may be applied to it, draw it down, and turn it to the side of the pubis. We shall have occasion to revert to this subject hereafter.

FIG. 144.

Mode of using the lever to pull down the occiput, or to flex the head.

The vectis ought not to be passed in too far, as it might come in contact with the face or sides of the neck and occasion serious mischief. About three inches would be far enough to bring it to the part upon which it is to act.

When the instrument is properly placed, the handle is to be raised, and the arch of the pubis serving as a fulcrum, it acts as a lever of the first kind. The head is then depressed by the power at the handle, and by drawing downward at the same time that this action of leverage is performed, is finally delivered.

To prevent injury to the urethra, the lever should be wrapped with a piece of linen or gum-elastic and placed a little to one side of the median line; but when applied in the way we have just described, it slips very easily, producing more or less contusion of the parts overlying the ischio-pubic ramus. To prevent all these inconveniences, the instrument ought to be held firmly at its middle by the left hand, so as to prevent slipping, at the same time that it is pressed strongly backward to strengthen, as it were, the fulcrum and lessen the pressure against the arch of the pubis.

The use of the vectis has been alternately depreciated and immoderately praised. It was strongly condemned by Baudelocque, and is at this moment so little known in France that our present classic authors devote barely a few lines to an account of it. This indifference to an instrument which has numerous partisans in Belgium and Holland seems to me unreasonable; and we also find that some French authors think better of it: Desormeaux, for example, who tells us that he used it successfully in two cases in which it would have been difficult to apply the forceps.

The subject is an important one, and I propose, in treating of it, to avail myself of the theoretical views and clinical facts which abound in Boddaert's excellent paper. I myself witnessed a case which convinced me that the vectis may sometimes be used with the greatest advantage, and sometimes even successfully when the forceps has failed.

In 1863, Professor Fabri (of Bologne), who wrote an important paper upon the vectis, being at Paris, I made some experiments with him upon the dead body. A contraction of the pelvis having been imitated by fixing a plate of sheet-iron upon the promontory of the sacrum, and a fœtus placed as though it presented by the vertex, I applied the forceps, but was unable, with all my strength, to bring it into the cavity of the pelvis. Dr. Fabri then used his lever, and immediately brought it into the excavation.

The experiment was repeated. I applied the forceps again, but with no better

success : taking then the lever, I have to assert that I accomplished my object with wonderful ease. It will be admitted that a result of this kind merits attention.

If comparison be made between the lever and the forceps, it will be found that they act differently. The forceps is an instrument for traction, and, in this point of view, is far superior to the vectis. That the head may be extracted by the latter cannot be doubted, for the facts are there to prove it; still, its power in this respect I regard as far inferior to that of the forceps. The lever acts, on the contrary, by compressing the head from before backward, and when compression in this direction is desirable, it would seem to have the advantage of the forceps.

Is not the exclusive use of one or the other calculated to deprive us of a powerful instrument? The vectis is not intended to supplant the forceps, but may be used in certain cases which it is important to determine, inasmuch as the surest way of exciting doubt of its utility would be to employ it without discretion. We shall, therefore, study the action of the vectis in, 1, presentation of the vertex; 2, in presentation of the face; 3, in presentation of the breech, when, the body having been expelled, the head remains in the genital parts.

Of the Vectis in Vertex Presentations. — We shall consider its use successively at the inferior strait, in the cavity of the pelvis, and at the superior strait, because the results to be obtained by it vary with each of these three conditions.

When the head, being at the inferior strait, is arrested by inadequacy of the expulsive efforts, or by too strong resistance of the perineum, the forceps has the very great advantage of acting as a powerful extractive agent in consequence of its enabling the operator to follow with it the central axis of the genital passage. In this respect the forceps is free from all reproach, and is far preferable to the lever which would have the bad effect of crowding the head toward the coccyx and removing it from the centre of the vulva. Besides this, it is liable to occasion laceration of the perineum, which is stated by all operators to be of frequent occurrence under these circumstances. There is nothing, then, to recommend the use of the lever at the inferior strait. We have but one reservation to make in favor of those rare cases of transverse contraction of this strait in consequence of the approximation of the ischio-pubic rami or of the tuberosities of the ischia, the use of the forceps being rendered difficult under these circumstances by the narrowness of the pubic arch, whilst the tractions direct the head too far forward. The lever, on the contrary, has the advantage of being easily applied in consequence of its small size, and at the same time by pressing the head backward, directs it towards the part of the pelvis which has not undergone contraction. Herbiniaux and Boddaert mention cases which seem to prove that, though under these circumstances the lever may be useful, it is the only case in which it has the advantage of the forceps at the inferior strait.

When the head is in the cavity of the pelvis, the forceps will still be almost always preferable for the same reasons. Nothing, in fact, can be more rational or easy than with it to turn the head to the proper direction, and then extract it in the direction of the pelvic axis. We have no doubt that the lever would be less efficient, and, especially in occipito-posterior positions, even hurtful, because when passed behind the pubis it might come in contact with the face and particularly with the eyes, and cause great mischief. Boddaert, however, used the vectis successfully in the pelvic cavity, but recommends it chiefly when the head is extended and the anterior fontanelle is near the centre of the pelvis. According to him, the forceps applied upon a head in this position would hold it so and cause it to engage with its oblique antero-posterior diameters, whilst the lever applied upon the occiput brings it down and causes the chin to approach the breast. In exceptional cases this procedure may be useful, but we think that in by far the greater number the forceps should be preferred when the head is in the cavity of the pelvis.

At the superior strait, on the other hand, the vectis would seem to have an un

doubted advantage over the forceps. That we may judge of this with a full knowledge of the reason why, it would be well, in the first place, to remember how the head presents at the superior strait, and how the lever and forceps are capable of acting upon it.

The head presents at the superior strait: 1, in an oblique or transverse direction; 2, it is imperfectly flexed as yet, and the occipito-frontal diameter coincides with the opening of the abdominal strait; 3, the direction which it has to follow, in order to descend into the pelvic cavity, is parallel to the axis of the strait, and consequently oblique from above downward, and from before backward. We would add, that all these conditions are exaggerated in contractions of the pelvis, which are one of the most common causes of dystocia, and, consequently, of surgical intervention.

If the forceps be applied under these circumstances, it is impossible to act otherwise than in direct contravention to all the indications. Thus: 1, the blades have to be applied to the sides of the pelvis, inasmuch as at that elevation it is difficult to place them obliquely; consequently the head is seized from the forehead to the occiput, in the direction of its longest diameter, which would make the extraction difficult; 2, the pressure of the branches together, in order to secure a firm hold, fixes the head and hinders the movement of flexion; 3, it is impossible to draw in the proper direction, and the head, instead of being brought down according to the axis of the strait, is always directed too much in front. We would add, that all these disadvantages are increased when the pelvis is contracted, and that it is often difficult or impossible to apply the second branch; besides this, the lateral compression of the head lengthens it from before backwards, which is precisely the direction of the antero-posterior diameter, the most contracted part of the pelvis.

The lever has the advantage over the forceps of being smaller, consisting, as it does, of but one blade. Besides this, its mode of action is entirely different; it presses only upon the occiput, which it tends to bring down, and, consequently, to increase the flexion. When applied behind the pubis, it also compresses the head from before backward, which is the direction of the obstruction to be passed, whilst it elongates it in the direction of the transverse diameter, which is not shortened.

These views seem to us both important and true. They are also confirmed by clinical observations, of which Boddaert's paper alone contains enough to be convincing, showing as they do, that labors rendered difficult from contracted pelvis have been successfully terminated by the vectis after the forceps had failed. "It is, therefore, only through a blind obstinacy that almost all the partisans of the forceps continue to use that instrument and reject the lever, which might be used so much more effectually. An accoucheur might be excused for this exclusive preference of the forceps if the affair were one of no consequence; but as it often happens that when it is used first, the woman cannot be delivered with it, and that both she and the child are in the greatest danger of death, it becomes impossible to adduce plausible excuses for the conduct of those who will persist in the immolation of so many victims." (*Boddaert.*)

The advantages of the lever are most evident when applied at the superior strait, and in cases of contracted pelvis; and we have seen how it fulfils all the indications. Its powerful action cannot be questioned, for in some cases it is found that the head plunges suddenly into the cavity of the pelvis with a peculiar crackling sound, indicative of the depression of the cranium upon the sacro-vertebral angle.

In applying it at the superior strait, the general rules should be observed, placing the blade upon the occiput in anterior occipito-iliac positions, and upon the mastoid region in transverse positions. In these cases, the manipulation of the instrument is very simple. The difficulty increases in posterior occipito-iliac positions, for there is then some danger of wounding the face when the lever is applied in front. Here it is necessary to act carefully, acquiring an exact knowledge of the relations

of the head to the various points of the pelvis, and then place the blade upon the frontal region, which is next to be pressed backward in order to bring the occiput in front. Let us take, for example, a right posterior occipito-iliac position; here the lever should be applied upon the left temple, in order to press the forehead backward and to the left, whilst the occiput turns from behind forward, and approaches the pubis.

When the head is once brought down into the excavation, it can, doubtless, be extracted by means of the lever; but, as we have already said, the forceps answer better, and in a case of the kind we would not hesitate to use both instruments successively.

Though we are disposed to believe that the vectis is capable of being very useful, some difficulty in its application must be looked for. In the first place, we would mention the mobility of the head above the superior strait, which makes the instrument liable to slip when the handle is raised, or the head to recede when pressed upon by the blade. Whoever uses the vectis in a contracted pelvis will recollect, also, that it is impossible to deliver below certain limits, and that attempts to do so at all hazards with the instrument must not be persisted in. Too forcible or too long-continued manipulations expose the woman to ruptures, vesico-vaginal fistulas, and endanger her life; the risk, in short, being almost the same for both lever and forceps.

The Lever in Face Presentations.—Ought the forceps or lever to be used in face presentations? We would reply that each case requires a separate answer, and that the principles which have guided us in the use of these instruments in vertex presentations, are also applicable to those of the face.

When the face is arrested at the superior strait, and especially when its progress is impeded by contraction of the pelvis, the lever may be preferred as in a vertex presentation, because it directs the head more in accordance with the axis of the strait, and reduces its volume from before backward, which is the direction of the shortest diameter of the pelvis. The forceps are liable to the same objection as in vertex presentations, to which may be added the fact, that, as the head is situated transversely, the placing of the forceps upon the sides of the pelvis would grasp it in an unfavorable position, and that, as one of the blades would be applied upon the front of the neck, the pressure there might be dangerous.

If the lever be preferred, the same rules should govern its application as in vertex presentations; therefore it ought to be applied above the face, with particular care to avoid compressing it; it must also be passed higher up, in order to place it upon the sides of the cranium or upon the occiput; finally, the head, through its agency, should be caused to undergo the same movements which it experiences in natural delivery.

When the face is in the cavity of the pelvis or at the inferior strait, the lever has no advantage over the forceps; it would even be dangerous when the chin is toward the front, because, if applied under the pubis, it would come in contact with the chin or with the neck of the child. It might, indeed, be used in posterior mento-iliac positions, with the view of turning the head in the pelvis and bringing the chin in front; but except in this particular case, the forceps should be preferred.

Application of the Lever upon the Head after the Body has been Delivered.—In breech cases, or during turning, it often happens that the child perishes in consequence of arrest of the head at the superior strait or in the cavity of the pelvis. Generally, well directed efforts with the hand are sufficient to overcome the difficulty; but no time is to be lost, and, if unsuccessful, the use of the lever or of the forceps is to be thought of. We state at once, that the forceps has the disadvantage of having two blades, which are applied with difficulty on account of the presence of the trunk; the advantage of the lever is, that it has but one blade.

Under these circumstances, Dr. Copper declares himself in favor of the lever. [1]

have learned," he says, "its merits through its practical application. It has been my fate to see children perish because the hand was unable to extract the head soon enough to save them. Reflecting on these cases, and remembering the good results which I had derived from the use of the lever in the various positions of the vertex and of the face, I conceived the idea of using it also after the body had been delivered, provided there should be any difficulty in the disengagement of the head. I was successful beyond my expectation. Every one will admit that rapid action is necessary in these cases. If the pelvis is well formed, try the manual process advised by authors; but if not immediately successful, have recourse to the lever without further loss of time. In cases where it is necessary to drag for a long time with the hand, the least effort with the lever suffices to extract the head; and in difficult cases, on account of contracted pelvis, the use of the instrument is most effectual." (Coppée.)

This method will doubtless be welcomed by the partisans of version in cases of contracted pelvis.

The operation is conducted according to the general rules: the woman lying across the bed, the body of the child is depressed towards the perineum, and in the meantime the vectis is slipped behind the pubis.

The conduct to be pursued is nearly the same, whether the head be at the superior strait or in the cavity of the pelvis. If the occiput be directed transversely or in front, the instrument should be applied either upon it or upon the mastoid region. But when the forehead looks toward the anterior arch of the pelvis, there is danger of wounding the face, and the temple is then the part to be acted on; remembering that the further the instrument is inserted, the less will the face be exposed to injury. The head, under these circumstances, has a position the reverse of that which it has in vertex presentations; so that, when the lever passes rather deeply, it goes beyond the face and applies itself either upon the forehead or upon the sinciput. Here, again, is the natural labor to be imitated and the forehead sometimes to be pressed backward, so as to roll it into the hollow of the sacrum, and sometimes to be brought directly down under the arch of the pubis. The state of flexion or extension of the head will indicate which course it is best to pursue.

When the head has reached the inferior strait, and, most especially, when it is arrested merely by the resistance of the perineum or vulva, the hand ought to be sufficient to complete its extraction; but if not, the forceps should be preferred to the lever.]

CHAPTER VI.

INDUCTION OF PREMATURE LABOR.

The title of *premature artificial delivery* is applied to a labor that is designedly brought on prior to the ordinary term of pregnancy, but not before the fœtus is viable.

No obstetrical operation has ever been more warmly or more profoundly criticised than this. In fact, it has been supported or condemned by the leading accoucheurs of all countries, and as a consequence of this disagreement among the masters of our art, no part of obstetrical science has ever been studied with greater care. To trace out the first dawning of the induction of premature labor, we should have to go back through the gropings

that characterize all human works, to the manœuvres of Aspasia, to the forced dilatations of the os uteri recommended by Louis Bourgeois and J. Guillemeau, or to the more gradual procedure of Puzos. But, in all of these methods, the principle differs wholly from the operation under consideration; for, "in a *premature* delivery, nature accomplishes nearly everything, art merely contributing a slight though certain impulse; whilst in the *forced* labors, art acts almost alone, for all that nature yields must be drawn from her by continuous efforts." (*Ritgen.*)

Under this important distinction, we believe there can no longer be any doubt that the induction of premature labor had its origin in England. According to a few writers, Mary Donally, a midwife of that country, first performed it in 1738; but most of the English authors look upon this as a gratuitous assertion. The judicious Denman states "that, about the year 1756, there was a consultation of the most eminent men at that time in London, to consider the moral rectitude of, and advantages which might be expected from, this practice, which met with their general approbation. The first case in which it was deemed necessary and proper, fell under the care of the late Dr. Macaulay, and it terminated successfully." His example was soon followed by numerous imitators.[1]

From Great Britain, this operation shortly passed to Germany, where it was proposed by A. Mai, of Heidelberg, in 1799, but Wenzel first put it in practice in 1804. Owing to his success, and the publication of Reisinger's remarkable work, it has since been supported by numerous and zealous partisans. It has been performed a number of times in Holland by Salomon, Welenbergh, and Schow; Lovati has been equally fortunate in Italy; and the periodical works of Denmark, of America, Switzerland, and Poland, have severally reported interesting cases of delivery before term.

In France, the reception of this operation into practice is quite modern; indeed, for a long time prior to its admission as a valuable resource, it was rejected as a crime. Roussel de Vauzesme proposed it as early as 1779, though it then received but little attention. It was imperfectly understood for a very long period, and we may doubtless attribute the blind and passionate opposition of Baudelocque and his pupils to their want of a clear and definite idea of what might be expected from its employment. Foderé, however, persisted in recommending premature delivery, on several occasions, notwithstanding the anathemas of this celebrated school. In 1830, M. Burchardt, in a remarkable thesis on this subject, sustained its propriety at Strasbourg, and, finally, in 1831, Professor Stoltz performed the operation for the first time in France, and with the most perfect success. Since then, all doubts have gradually vanished, and most of the French accoucheurs have at length adopted a practice, which has now, for nearly a century, rendered such important services to humanity.

[1] The first idea of the induction of premature labor is found in Raphael Maynus (Lib. II., chap. 16, p. [illegible]); he recommends the premature delivery of labor with the object of saving the mother, at two different periods of pregnancy. In the first months, before the fœtus becomes animated, and in the last two months, because then "fœtus etiam si per vim ab utero extrudatur, vivere tamen potest, aut saltem non defraudatur vita æterna, quia vivus nascitur et baptizari potest."

[In 1832, two years subsequent to Burkhardt's thesis, Dezeimeris, in an article published in the *Dictionary in thirty volumes*, defends in his turn the induction of premature labor in cases of deformity of the pelvis; making reservations, however, in respect to other indications for the operation. M. P. Dubois, in his thesis for the Concours, (1834.) also recommends the same practice in certain cases of contracted pelvis, and in 1840 he presented to the Academy of Medicine the account of a mother upon whom he had carried his views into effect with entire success Since that time, his numerous pupils at the Hospital of the Clinique have witnessed many similar operations. In 1847, Professor Dubois also published a work upon the propriety of inciting labor in certain cases of disease during pregnancy. Since that time, many papers have appeared on this subject, and numerous theses been defended before the Faculties of Paris, Strasbourg, and Montpellier. We would mention, as amongst the most meritorious of the latter, those of M. W. Lacour and Lazare Sée, which contain documents both numerous and important. At present, everybody is well satisfied that premature artificial delivery is one of the finest operations of obstetrical art, and that its use will become increasingly frequent.]

Being once rid of the question of its morality, which for so long a period deterred some practitioners, who did not hesitate about the Cæsarean operation or symphyseotomy,[1] we have only to resolve, at the present day, the two following questions: In what cases is premature labor to be induced? And which is the best method of effecting it?

ARTICLE I.

CASES REQUIRING A PREMATURE DELIVERY.

A. When summing up the indications presented by the pelvic deformities, it was stated that premature labor might be brought on where the smallest diameter of the pelvis did not exceed three and three-quarter inches, and where it was not less than two and a half inches; but we must now explain this proposition more fully.

It should be remembered that this operation is always resorted to for the double purpose of saving the child's life, and of preserving the mother from a danger which very frequently threatens her own existence. In other words, it is not to be attempted until the pregnancy is so far advanced that the viability of the fœtus is fully established, and only in those cases where the contraction of the pelvis is such that delivery at term is wholly impossible without performing either a bloody operation on the patient, or mutilating her child.

The French law, which has been constructed with a view of meeting all possible anomalies, has decided that the end of the sixth month is the period at which a fœtus might be considered viable; but, laying aside some rare exceptions, which ought not to be brought in question, every practitioner well knows that the fœtus seldom lives if born before the end of the seventh month. Consequently we should not think of determining its premature expulsion before the full term of seven months. Although this point is

[1] It is really wonderful that the consequences of this operation have been so long dreaded; since, in two hundred and fifty cases collected by M. Lacour, in the commencement of 1844. more than one-half of the children survived, and scarcely one woman in sixteen died. Let any one compare these results with those furnished either by symphyseotomy or by the Cæsarean operation.

easily decided, so far as the interests of the new being are concerned, yet with regard to the mother such is not the case; for the mere assertion that this operation is to be performed whenever it is known that a natural delivery at term will be impossible, is altogether too vague and uncertain for a question of such importance; and therefore the two following points are to be established with the greatest possible precision; namely, 1st, the degree of contraction beyond which the provoked delivery is no longer practicable; and, 2d, within what limits its employment is justifiable.

As the operation is only admissible after the seventh month of gestation, we must of course ascertain what is the length of the various diameters of the head at that period; because the extent of the biparietal diameter, which in most instances corresponds to the contracted one of the pelvis (the antero-posterior), will evidently show to what ultimate degree of pelvic contraction delivery is still possible. Now, it appears from the researches of Dubois, of Stoltz, and Madame Lachapelle, that the biparietal diameter at the end of the seventh month averages from two and a half to two and three-quarter inches; in addition to which, we may hope for a further reduction of one-fourth of an inch, on account of the compressibility of the head. Therefore, the smallest pelvic diameter must be two and three-quarter inches at the least. This, then, is the extreme limit beyond which the induction of premature delivery is no longer to be thought of as affording any chance of success.

[A few cases of deliveries having been effected through a contraction of two and a quarter inches (see page 646), rare and fortunate as they are, would seem, however, to prove that the limit mentioned above may be extended to two and a quarter inches. I am aware that exceptional facts do not justify the relinquishment of general rules, yet I think that pelves contracted to two and a quarter inches, call for the induction of premature labor; if, when this is done, it be still impossible to deliver the fœtus alive, embryotomy is the last resort, and will be more easily performed on account of the imperfect development of the child.

Below two and a quarter inches, premature labor ought not to be thought of, unless as preliminary to the easier accomplishment of embryotomy. It now remains to decide upon the limit above which it were useless to bring on premature labor, as also the time when, if done, it were best to accomplish it. The solution of this double question depends upon the gradual development of the fœtus after the seventh month of intra-uterine life. The dimensions of the fœtal head may be estimated approximately as follows: At seven months, the great transverse or biparietal diameter measures two and three quarter inches; at seven months and a half, three inches; at eight months, three and three-sixteenth inches; at eight months and a half, three and three-eighths inches; at nine months, three inches and nine-sixteenths. Beside this, a certain amount of diminution may be counted on varying in different cases from three-sixteenths to six-sixteenths of an inch. Assuming one case as an example, it is proper, therefore, taking the above reduction into account, to bring on labor at eight months and a half when the pelvis has a diameter of but three inches and three-sixteenths of an inch, and to fix three and three-eighths inches as the limit above which it were useless to induce it.

Unfortunately, these dimensions have but a mean value, for they vary in every case with the size of the child, and the extent to which the head will yield, nor are there any clinical means of ascertaining the differences beforehand.

Many accoucheurs hold that, in a first pregnancy, premature labor ought not to be thought of when the pelvis has a diameter of more than three and three-eighths

of an inch. Indeed, the fact that the woman is pregnant for the first time has been regarded as a formal contraindication of the operation. We shall state our own opinion the more freely on this subject, as we cannot understand why there should be any doubt about it. Premature artificial delivery is an innocent operation; how great, therefore, would be the regret if, after having waited until term, it became necessary to perform embryotomy upon a child which might have been saved by the former operation! In the interest, therefore, of the child itself, were it not better that it should encounter the inconvenience of a premature birth than the danger of a difficult delivery by the forceps? We would, therefore, in a case of first pregnancy, recommend premature delivery whenever we felt uncertain as to the result of labor at term, at the risk of being accused of having accomplished it unnecessarily; with much less hesitation, therefore, would we advise it when the pelvis is so contracted that labor at term would probably be very difficult or even impossible.

Previous labors afford fuller information as to what may be expected. If labor at term has been impossible or very difficult, premature delivery is indicated, however slight the contraction of the pelvis may be. But supposing the labors of a woman who has already borne children, have been easy, notwithstanding a contraction of three and three-sixteenths of an inch, ought anything to be done? Almost all accoucheurs reply that it would be better to wait, inasmuch as the probabilities are in favor of all the subsequent deliveries being accomplished in the same manner. I should feel less certain on this point, because there may result, as I have seen, a labor so difficult as to require the performance of embryotomy. Consequently, I would willingly advise the induction of premature labor in a case like the one supposed.

The longer the fœtus remains within the uterus, the more probable is it that it will survive. This proposition, acceded to by all, becomes a law to the accoucheur, requiring him to postpone premature labor as long as possible. It is plain that it ought not to be had recourse to, unless the interest of the mother or of the child should require it, and it would be immoral to operate recklessly, without a serious motive. Still, there should be no hesitation through mere timidity, inasmuch as there is no real ground for it. One does not grieve long over a spontaneous premature delivery, and we know that, by care, many of the children may be raised. Whether premature labor be spontaneous or artificially induced, the material conditions are the same; why, therefore, should there be any great hesitation in cases where it is proper to effect it artificially?]

Perhaps it would be proper here to give our opinion with regard to certain circumstances that have been stated by some accoucheurs as contraindications to the induction of labor; we allude to twin pregnancies and malpresentations. Could it be certainly ascertained that the patient was pregnant with twins, the time for performing the operation might be considerably postponed or everything even be left to nature if the pelvis were not very much contracted. The reason for this is, that twins are generally smaller than single children and their organization rarely complete enough to enable them to live when born before term.

With regard to a malpresentation of the fetus, were we to pay any attention to it, we should often lose the advantages of the operation, since this is an obstacle of very frequent occurrence. And as a delay of a few days only may compromise the success of the attempt, it would be better to change the presentation by external manipulations, as performed by Stoltz. When this measure proves unsuccessful in modifying the presentation, we should

still endeavor to excite the uterine contraction, so as to perform version as soon as the os uteri shall be sufficiently dilatable.

The mere detection of a vertex presentation is not a sufficient reason for feeling secure as respects an unfavorable position. In one of the six operations which I have had occasion to perform, although the contraction affected the antero-posterior diameter, the head presented in an occipito-pubic position after the membranes were ruptured: and as this circumstance required the application of the forceps and considerable traction, the child was born dead.

B. The cases in which there is a contraction of the pelvis do not constitute the only ones in which premature labor has been recommended. For the many serious diseases to which females are subject during the latter months of gestation are evidently connected with that condition; and depletion of the womb is the best and often the only means of removing them. This is also advised by some writers in certain affections that endanger the patient's life; among others, M. Ferniot has endeavored to prove, in a recent thesis, that under such circumstances the premature labor is quite as justifiable as in the pelvic contraction. Forced delivery was long since recommended in cases of profuse flooding, particularly in those dependent on the insertion of the placenta over the os uteri; and the artificial rupture of the membranes, resorted to in our day, is merely another method of bringing on the uterine contractions. Further, many skilful physicians have not hesitated to bring on labor when an attack of convulsions has resisted the ordinary remedies, or which, after being checked, returned every few days with a constantly increasing severity, (see pages 813 and 820.) And why should not the same course be pursued, when any serious disease, that existed before pregnancy, is so highly aggravated by this condition as to threaten an early termination in death, if its course be not speedily arrested by emptying the womb? In 1827, M. Costa submitted the question to the Academie de Médecine, whether or not it is proper to bring on labor whenever the pregnancy is complicated by any disease that seriously threatens the mother's life, supposing the fœtus is viable. We think the Académie erred in treating this proposition as *inexpedient;* for although Costa's question was too general, and, doubtless, ought to have been better matured before making a final decision, yet restricted within certain limits, determined by observation, it already has received and will still receive numerous applications in practice. For instance, an aggravated disease of the heart, general serous infiltration of the tissues, accompanied by effusions into the great cavities, a threatened suffocation, and the existence of a large aneurismal tumor, which is liable to be ruptured from the obstruction to the general circulation caused by the developed uterus, are certainly quite as dangerous as flooding or an attack of convulsions; and a premature delivery appears to me advisable, after all the therapeutical resources usually resorted to in such cases have been tried without benefit. It is important, however, that a determination of this kind should be come to very carefully, and, as often as possible, after consulting with enlightened practitioners.

In describing the disorders to which the pregnant condition exposes the female, it was stated, that whenever they became so serious as to threaten

the life of the patient, we thought that the induction of premature labor was thereby sufficiently justified. Thus, vomiting which resists all therapeutic measures, extreme dropsy of the amnion, ascites connected with amniotic dropsy and threatening the patient with suffocation, and the recurrence of convulsions at short intervals and with increasing severity, are all of them, we have said, sufficient reasons for performing the operation.

But these are not the only cases in which the operation has been proposed, and we have yet some other indications to settle.

1. *Abdominal Tumors.*—In treating of the various tumors that so often complicate pregnancy and parturition, Dr. Ashwell suggests premature delivery as the most certain method of preventing those serious consequences, to which the patient is then exposed during the labor, or lying-in. But this opinion, in our estimation, is only admissible in the following cases:

1st. When any voluminous tumor whatever exists in the belly and incommodes the enlargement of the womb; or is itself exposed to such a compression as almost necessarily to lead to consecutive inflammation.

2d. When a tumor developed in the excavation is so fixed and adherent to the pelvic walls that it can neither be pushed above the superior strait nor drawn down beyond the vulva; provided its bulk is sufficient to prevent the expulsion of a fœtus at term.

2. *Smallness of the Abdominal Cavity.*—The capacity of the abdominal cavity in some individuals of very low stature, is so small as to be insufficient for the normal development of the uterus, which after attaining a certain bulk might render the regular performance of the great functions impossible. Thus, M. Depaul mentions a case of asphyxia occurring in a rachitic female who was affected with a deformity of this kind. Hence, it is evident that under similar circumstances, premature delivery might and ought to be thought of. Still, it is rarely necessary to have recourse to the operation, for the elasticity of the soft walls of the abdomen of these individuals permits the development of the uterus to take place outside, as it were, of the abdominal inclosure; and if the walls should prove too resisting, it is infinitely probable that in consequence of its violent compression, the uterus would enter spontaneously into action.

3. *Nervous Disorders.*—The nervous disorders which come on during gestation may sometimes become so serious as to suggest the question, whether it be not advisable to terminate the pregnancy which gave rise to them. M. Dubois was consulted in the case of a young lady in the third month of gestation, who had been affected for six weeks with symptoms resembling chorea. The spasms were first limited to the voluntary muscles, but finally invaded those of organic life, so that deglutition and speaking had become difficult. All the antispasmodics had been employed without success. M. Dubois replied, that he approved of the means that had been used, but that, whenever the convulsions invaded important organs, he anticipated the necessity of inducing premature labor.

We have in charge a young lady who, when in her ordinary health, has, very rarely, some short paroxysms of asthma, and then almost always in consequence of an emotion or physical pain, but which become much more frequent and distressing when pregnant. Having reached the fourth month

of a fifth pregnancy, she has just had a slight attack of varicella, preceded by six days of intense fever. During these six days, the suffocative paroxysms became so serious, that MM. Andral and Dubois, who were called in consultation, delivered the most unfavorable prognosis. All these symptoms vanished upon the appearance of a dozen very small pustules, only two of which presented the umbilical depression. The idea of premature delivery might certainly present itself, should such accidents reappear and continue at a later period of the gestation; but it should not be forgotten that, as M. Laborie remarks, too much haste should not be made, inasmuch as these nervous phenomena often cease instantaneously; and the operation should be carried into effect only when the condition of the patient demands it imperiously.

4. *Intercurrent Acute Diseases.* — Most of the acute affections which occur during pregnancy, seem to be affected unfavorably by abortion and spontaneous delivery. We have already stated that in cholera, in which the induction of premature labor and abortion have been recommended as a therapeutic measure, there was nothing to prove conclusively that the expulsion of the fœtus was attended with any favorable result. We think therefore that, as yet, it were wisest to abstain.

5. *Death of the Fœtus in preceding Pregnancies.* — There are certain women who, after reaching the eighth or ninth month of gestation without the slightest disorder, suddenly find the active motions of the fœtus to diminish, and the child dies. This unfortunate event occurs with some again and again, for several consecutive pregnancies, so that certain females have been known to be delivered thus prematurely, and always of a dead child, five and six times in succession. Denman, and several others, thought that by bringing on labor before the period at which the fœtus had perished in the preceding pregnancies, there would be a chance of obtaining living children. In two cases mentioned by the English author, the operation proved successful. The indication should not, therefore, be entirely rejected. However, it is well to observe with M. P. Dubois, that, notwithstanding the fatal termination in preceding pregnancies, there is always cause to hope for a happier issue as respects the one in charge, so that it is impossible to establish a general rule in reference to the matter. It is one of the cases in which the responsibility of the physician is deeply implicated. (See page 558.)

6. Finally, the induction of premature labor has also been recommended in cases in which the fœtus is dead, and in pregnancies which overrun the usual time. At present, and especially in France, the supposed disorders attributed by Mai and Fodere to the death of the fœtus in the womb, are no longer believed in. Expectation is adopted, because it is well known that the mother incurs no danger, and that nature will rid herself of the dead fœtus without requiring the intervention of art. Nor are the dangers of the delayed pregnancies less illusory.

ARTICLE II.

OPERATIONS FOR THE INDUCTION OF PREMATURE LABOR.

The methods proposed for effecting the premature expulsion of the child are quite numerous; they are all based upon the contractile power of the

womb, which they are intended to call into activity until the ovum is expelled. We shall divide them into three classes, to the first of which belong all those which, by primarily influencing the general organization, have the secondary effect of exciting the uterine contractions; to the second, those depending upon the excitement of some organ, the breast for example, which by reflex action stimulate the uterus to contraction; and to the third, all those that operate directly and mechanically upon the womb, for the purpose of arousing its action.

The operation of the means appertaining to the first division is too uncertain to be relied upon in a case where it is necessary to act promptly and surely; and although tepid bathing, venesection, &c., have occasionally been followed by a premature delivery, yet no one would ever think of employing them with this view. Even the partisans of ergot are few in number; for though its influence in rendering the slow and feeble contractions of the organ more energetic is undoubted, there is no positive evidence that it is capable of arousing them when none have previously existed.

[The second class includes the means of stimulating the womb by reflex action. To effect it, the close sympathy known to exist between it and the breasts is made use of, the stimulus applied to the one being reflected upon the other. The observation of this fact led Frerichs to suggest the application of sinapisms and flying blisters upon the breasts in order to excite uterine contraction. Scanzoni afterward took up the idea and recommended the application of gum-elastic cups to the breasts, reporting at the same time several instances of success, though he also witnessed some cases of fainting produced by them. Chiari, Kilian, and Stohl have not met with much success by this method, so that, upon the whole, it must be reckoned as too uncertain to be relied on.

Therefore the agents of the third class only, which act directly upon the ovum or the womb, are capable of bringing on with certainty, the contractions of the latter. We shall divide them into five categories, determined by the part to which they are applied, viz: A. External stimulation of the body of the uterus; B. Stimulus applied to the circumference of the os tincæ; C. Dilatation of the neck of the womb; D. Stimulants inserted between the walls of the uterus and the ovum; E. Rupture of the membranes.]

A. External Stimulation of the Body of the Uterus.

Dry Frictions over the Abdomen. — The repeated frictions over the anterior part of the belly, and the fundus of the womb, originally recommended by Professor D'Outrepont, to which Ritgen added direct excitation of the os uteri by one or more fingers introduced into the vagina, are now generally rejected. In truth, the irritation thereby produced is too feeble and transitory to bring on a genuine labor.

[*Electricity.* — Electricity was proposed and tried by both Kilian and Schreiber without much effect. One pole of a galvanic battery was put in connection with the fundus of the womb and the other with its vaginal portion. An electro-magnetic apparatus may also be made use of; that of the Lebreton brothers was tried by M. P. Dubois, though without success. Great hopes, indeed, had been based upon electricity as an agent for producing the effect in question, but experience soon showed that they would have to be relinquished. (See page 1086.)

B. STIMULUS APPLIED TO THE CIRCUMFERENCE OF THE OS TINCÆ.

The means of accomplishing this, comprise the various modes of applying the tampon, and douches either of water or of carbonic acid gas.

Hüter's Process. — Hüter inserted into the vagina, so as to be in contact with the neck of the womb, a bladder filled either with water or decoction of ergot, hoping that the latter medicament might transude by exosmosis and assist the mechanical action of the bladder. Prof. Bush substituted a dog's bladder for that of a calf, and advised it to be withdrawn every six hours, in order to wash out the vagina by means of injections. This process is deficient in irritating power, so that in most of the cases in which it was used, it was necessary to have recourse to more energetic measures.]

Schaller's Method. — Quite recently, Dr. Schœller, of Berlin, has suggested a measure which is new as to its proposed object, though one of long standing in obstetrical science. Every practitioner is aware of the principal objection to the use of the tampon, so highly extolled by Leroux, of Dijon, as a remedy for uterine hemorrhage; now M. Schœller has conceived the idea of employing the irritation it produces as a means for the induction of premature delivery; for it is well known that its application is most generally followed by uterine contractions. He first made use of it in 1839, and was entirely successful; since that time he has performed five similar operations, and the child was born living in four of them. The mode of operating, according to Stoltz's translation, is as follows (*Gaz. Méd. de Strasbourg*, Jan., 1843):

Before commencing, the bladder and rectum are to be emptied; then several little rolls of charpie, steeped in oil, or smeared with cerate, are successively pushed towards the upper part of the vagina, the first of them having a piece of tape attached, to facilitate its subsequent extraction. Prepared sponge might be used for the same purpose, but it would then be requisite to retain it *in sitû* by another common sponge. It is not necessary to fill the whole vagina; in fact, this would be attended with some inconvenience, for the excretion of the urine and fecal matters would be thereby impeded. It is advisable to introduce the tampon in the evening, when the patient is recumbent, because she will be more likely to remain quiet during the early periods of its operation.

The effects of this measure are shortly manifested by pains in the abdomen and loins, and by a feeling of tension in the womb itself; repeated frictions are then made over the fundus uteri, with a view of aiding its operation. As the tampon soon becomes saturated with the mucus from the vagina, and exhales a disagreeable odor, it ought to be renewed at least once in the course of the day, or even twice, if the sensibility of the parts permits; but, before introducing the second one, the vagina is washed out by an injection. As soon as the tampon has roused the uterine contractility, and the orifice dilates, it may be withdrawn; though, should the labor be lingering, and the contractions become slow and feeble, it must be reapplied, and ten grains of the secale cornutum be administered by the mouth every half hour. The pains may also be restored by dilating the orifice with the index finger, carefully avoiding a rupture of the membranes, until the dilatation is nearly completed.

[Schœller's tampon, unfortunately, is both uncertain and painful in its application. Hoffman's statistics show that out of 20 cases it succeeded in 12 only, when used alone. Once it was necessary to dilate the cervix besides, and in 7 cases it had no effect whatever.

Braun's Process.—Braun (of Vienna) proposes substituting Schœller's charpie tampon, and Hüter's bladder of animal membrane, by a reservoir of vulcanized gum-elastic from two to four inches in diameter, and provided with a stopcock. His instrument has received the name of *Colpeurynter*, and is used very easily, being managed like Gariel's air pessary. It is first emptied and inserted into the vagina, and afterward dilated by the injection of warm water. The gum-elastic bulb does not deteriorate like the bladders of animals; besides which, Braun claims for it the advantage of distending the upper part of the vagina only, without compressing the lower portion.

Professor Stoltz says that the colpeurynter has been used only five times in cases of contracted pelvis, and twelve times in cases of disease during pregnancy. It proved ineffectual in the first set of cases, but succeeded better in the second, probably because there was already present a tendency to labor.]

Uterine Douches.—Lastly, there is a still more recent process, possessing undoubted advantages over all the others, namely, that which consists in directing a stream of warm water upon the neck of the uterus. The honor of introducing it into obstetrical practice is due to Professor Kiwisch. His apparatus was a simple tin box, provided with a long tube furnished with a stopcock. The extremity of the tube is introduced by the vagina to the neck of the uterus. The temperature of the water should be about 76° or 78° of Fahrenheit, and the jet should be large and powerful. The injections should last from 10 to 15 minutes without interruption.

Instead of Kiwisch's apparatus, M. P. Dubois uses Dr. Eguisier's instrument for irrigation and steady injection. The latter containing six quarts of fluid, is sufficient for a douche of a quarter of an hour in duration, and there is no occasion to renew the water as in Kiwisch's contrivance. Besides, there is no necessity for its being very elevated like the other, which renders it much more convenient to manipulate. I made use of Eguisier's pump in the three cases in which I employed the uterine douches. Unfortunately, it is quite expensive, and not readily procured out of the city. Therefore, it is well to remember that any vessel capable of containing eight or ten quarts of water, placed at an elevation of seven or eight feet, and provided with a flexible tube of sufficient length, will serve the same purpose. The tube is furnished with a stopcock about a foot from its free extremity. To this extremity is adapted a gum-elastic canula with a single orifice the sixteenth of an inch in diameter. The power of the jet may be increased or diminished at will by varying the calibre of the canula.

The woman's seat is brought to the edge of the bed, which is previously covered with oil-cloth, so that the water may fall into the vessel placed between the legs without wetting the clothes or the bed. The forefinger of the left hand is introduced to the cervix for the purpose of guiding the canula which the accoucheur holds in the right hand.

In ordinary cases three or four injections a day are sufficient, though, if the case were urgent, they should be repeated more frequently.

The number of douches required varies greatly. Sometimes the contrac-

tions appear upon the third or fourth application; in one of my own cases, the first pains were perceived after the second douche, though generally a much greater number are required. In the ten observations of Kiwisch, he was obliged to repeat them four times at the least, and eighteen times at the most; the mean for the ten cases being ten douches.

The mean length of time between the commencement of the operation and the moment of delivery, was about three days and a half. In one case, but twenty-four hours elapsed, whilst in two others it was delayed seven days.

[To increase the efficiency of the uterine douches, it is only necessary to direct the extremity of the canula upon the os tincæ, so that the water may be projected directly into the neck of the uterus. M. Blot on several occasions even inserted the canula into the neck, so that the jet reached and detached the membranes. This is a modification of Kiwisch's method, well calculated to bring on labor within a very short time.

There can be no doubt as to the efficiency of the douches, and they are, consequently, very much used. The apparatus is made very readily, and women submit willingly to an operation of so simple a character as to be readily understood by them, and which gives them no pain.

Of eighty-one cases quoted by Stoltz, in which the douche was used in order to bring on labor, it, alone, was successful in sixty-eight; but in thirteen cases it was necessary to use more active measures in addition. The method, therefore, sometimes fails, which is not, however, the most serious objection that can be made to it. Though I have often had occasion to use it both at the Maternity Hospital at Paris and at the hospital of the Clinic, I do not share the enthusiasm to which it has given rise. It is almost always slow in its action, and so exhausts the patience of both the woman and the operator, besides compromising the successful issue in some cases by the delay which it occasions. But this is not the worst, for notwithstanding all that has been said of its innocency, the douche is dangerous, and may prove rapidly fatal. In a paper read at the Academy of Medicine I related the case of a woman, the posterior cul-de-sac of whose vagina was lacerated by it; an event which experiments upon the dead body assure me is of very possible occurrence when a powerful apparatus is used. I also reported several cases of sudden death whilst the douche was being administered under the charge of such men as MM. Depaul, Salmon (of Chartres), and Simpson, whose skill is beyond questioning. Prof. Depaul, in relating his own case to the Surgical Society, thought he could account for the event by the introduction of a few bubbles of air into the uterine sinuses, and I think his explanation a good one, for in every instance the symptoms observed were those produced by the entrance of air into veins. It will readily be admitted that such accidents as these ought to make accoucheurs more careful in the use of uterine douches than they have been.

Douches of Carbonic Acid Gas. — Scanzoni of Wurtzburg recommends the use of a jet of carbonic acid gas, directed upon the neck of the womb by an appropriate apparatus. Though employed by its author, the method is not likely to come into common use.]

c. Dilatation of the Neck of the Womb.

Dilatation by Prepared Sponge. — Some accoucheurs have endeavored to bring on contraction of the womb by keeping a foreign body within its neck, which shall act both as an irritant and a mechanical dilator. Kluge may be regarded as the inventor of the process by dilatation, and his method is the

one still generally preferred. It consists, as is well known, in the insertion of a cone of prepared sponge in the cervix, and keeping it there by means of a tampon, until the pains are fully developed. The mode of operating is as follows:

After having obtained the patient's consent, and, whenever possible, the advice of some professional brethren, the accoucheur has the woman prepared, by directing her to use warm emollient and narcotic injections into the vagina, for a few days previous to the operation; before commencing, the bladder and rectum are to be emptied, and a fresh examination is to be made for the purpose of ascertaining the degree of the pelvic contraction, as well as the child's position.

The female being placed in nearly the same position as if the forceps were to be applied, the operator first draws the cervix towards the median line, whenever it is found deviated; or he might endeavor to get the neck within the uterine extremity of a speculum (Dubois). But this is not always practicable, especially if the part be directed a little forward; in general, the finger answers every purpose as a conductor; then a conical plug of prepared sponge, about two inches long, and half an inch in diameter at its base, and having a piece of tape ten inches long attached to it, is held by its large extremity, in a pair of long curved forceps, and is carried up towards the uterine orifice where it is gradually made to enter. After holding it there for five or six minutes, the forceps and speculum (if used) are withdrawn, and the vagina is next filled up with a large sponge, or bits of charpie, so as to keep the first sponge in its place; the whole is to be retained by a proper bandage, and the patient replaced in bed. The mode in which the foreign body acts here is obvious; the prepared sponge becoming saturated with the fluids from the neighboring parts, swells up, and irritates the cervix by its bulk; this determines a dilatation of the latter, and the irritation thus caused, by reacting on the fibres of the uterus, often brings on the contractions in five or six hours. Should it happen that the pains are not fully established, or the dilatation of the os uteri is not completed in the course of twenty-four hours, the operation ought to be performed again, taking care this time to introduce a larger piece of sponge (the first having been extracted by the tape); this second operation is nearly always successful. If, however, the labor-pains be still too slow and feeble,

FIG. 145.

Kluge's method of dilating the os uteri.

local irritants, such as frictions over the abdomen, and titillations of the cervix, or, still better, the general stimulants, ergot particularly, might be resorted to.

The necessity of plugging the vagina, and keeping the tampon applied for two or three days, and sometimes even longer, occasions great suffering to the woman. From having witnessed this suffering, I had an instrument constructed, in 1845, by means of which the prepared sponge is kept in its place within the cervix. It is composed: 1. Of a hypogastric belt, to the middle and front part of which is secured a metallic stem eight inches long, and curved at its free extremity, which carries a canula one and a half inches in length; 2. Of a stem of whalebone, six or seven inches long, and about a quarter of an inch in diameter, bearing at its extremity a forceps with claws capable of being closed at will, by means of a sliding ring, like those of a porte-crayon. The prepared sponge is first fixed in the forceps and then introduced as usual within the cervix: the whalebone stem is next introduced into the canula and held fast by the pressure of a screw.

In this way, the use of the tampon, which is always painful, is avoided; the sponge cannot be displaced and escape from the cervix, as often happens in Kluge's process, nor are the functions of the bladder and rectum in any degree interfered with. The patient is not condemned to the absolute repose usually directed, but can move in bed without inconvenience. I therefore regard it as a plan which does away with most of the inconveniences justly complained of in the performance of the operation.

[Sponge-tents should never be used for this purpose, on account of the danger of septic infection. The best means for inducing labor is to insert a gum-elastic catheter or bougie into the uterus between its wall and the membranes, and leave it there to be expelled with the child.]—P. F. M.

[A great recommendation of the prepared sponge is, that it acts very gently and is devoid of danger either to mother or child; on this account it was preferred by all accoucheurs before Kiwisch's method was known. Unfortunately, the operation, apparently so simple, is really quite difficult: for the cervix is often so high up that it is found to be no easy matter to fix it with the fingers and insert the sponge. Kluge himself, in one case, after several fruitless attempts, was obliged to relinquish his own process.

Chiara discontinued the use of the sponge-tent about seven years ago, chiefly on account of its liability to cause (or convey) septic infection. When it is necessary to dilate the cervical canal in order to introduce the elastic syringe, he prefers laminaria or tupelo. In using the douche Kiwisch's procedure the stream should be directed against the anterior or posterior lip of the cervix, and not into the os. If the os is dilated, the stream should play against the blade of the speculum, so that a wave, and not a column, of the liquid shall play against and excite the cervix. In the Milan clinic the uterine douche has been used hundreds of times in a year, and since 1875 there has not been the slightest accident.

Busch's Dilator.—Busch devised a three-branched dilator which, when closed is of about the size of a pair of dressing-forceps, and whose slender extremity passes easily into the uterine orifice. When used, it is inserted into the neck to the distance of five-eighths of an inch only, and then opened further and further at intervals, until it shall have excited contraction of the womb or occasioned considerable local pain. Busch's instrument has far less merit than the sponge; its action is intermittent, and its valves, as they spread, act only on the points with which they are directly in contact, necessarily giving rise to painful stretching.

The results obtained by this instrument are neither numerous nor encouraging. Hayn, it is true, professes to have excited the pains of labor in eleven hours; but Busch himself never accomplished the same object in less time than three days, and in two cases not until after eight days of strong and painful effort. There are, therefore, serious objections to the process, and it ought never to be used unless for the purpose of facilitating the introduction of a cone of prepared sponge.

Krause's and Meade's dilators are very similar to Busch's instrument, and are liable to the same objections.

The Spheno-Siphon.—The dilator invented by Schnackenberg is entirely different from the preceding. It is called the spheno-siphon, and is composed of a syringe, to which is adapted a tube two inches in length, and provided with two lateral fenestra. The latter is covered with a distensible bag of prepared skin, which, when most widely dilated, has a diameter of from an inch and three-quarters to two inches. The operator passes the canula gently into the cavity of the neck, and when *in situ* depresses the piston, which is held by a screw. This ends the operation for the first day, and the instrument is attached to a body bandage. The next day the piston is pressed down still further, forcing more fluid into and dilating the bag. The same process is repeated on the third day.

The spheno-siphon, like the prepared sponge for which it is a substitute, is intended to dilate the cervix mechanically and excite the uterus to contraction. It is a complicated instrument, necessarily inconvenient to the patient, and seems thus far not to have been put much into service. It is figured in Busch's Atlas.

Barnes' Dilator.—Dr. Barnes introduced, in the year 1862, a new dilator, composed of a gum-elastic bag, in shape resembling a violin, and ending in a long tube. The instrument is of three sizes, the smallest being from three-quarters of an inch to an inch and a quarter in width. The inventor begins by exciting contractions through the use of the uterine douche, Braun's colpeurynter, or the prepared sponge, and when the neck is sufficiently dilated, inserts his bag by means of a probe whose end passes into a little pouch made for the purpose. The central part of the dilator is intended to be co-extensive with the entire length of the cervix, its upper extremity extending beyond the internal orifice, whilst the lower one projects into the vagina. The peculiar shape of the instrument is intended to guard against its slipping; for when distended, its middle portion is cylindric, whilst the ends spread out like a mushroom. When *in situ*, water is forced into it by means of a syringe, and its distention dilates the neck considerably. A larger instrument is then substituted, and the process continued until the dilatation is sufficient to allow version to be performed.

Dr. Barnes' method is complicated, and his instrument comes into play only when labor has begun through the use of other means. Therefore, as his object is merely to hasten it, he entitled his paper, "*A New Method of Accomplishing Premature Delivery at a Specified Time.*" But let us hear the author himself: "All the known methods of exciting premature labor are very uncertain as respects the time required for producing the desired result. The slowness of the process is liable to serious objections, for whilst the accoucheur is kept waiting for hours and days for the labor to be completed, the woman herself is worried by the delay and tormented by fear. Thus her moral and physical forces are severely tried, and, after all, when the delivery is about to take place, the doctor may be away. Thus mother and child are exposed to needless risk.

"Nor is the doctor's position an enviable one: when he began the operation for inducing labor, he involved himself in professional responsibility and personal solicitude. He is obliged to be at the disposal of the patient until she is delivered, and can, therefore, assume no other engagements. This impossibility of being at liberty, and that for an uncertain period, is a serious inconvenience, not only to himself, but to his other patients. Now the patient, as well as the physician, may be relieved

of all these uncertainties and inconveniences by the operation which I propose, and which has proved successful on various occasions. Labor may be brought on at will, and terminated at any hour he chooses, with as much certainty as any other surgical operation. By adopting the new method, he may attend to engagements at any distance from home, and then finish the case at once, just as he would cut for the stone. The operation is under the entire control of the performer, who is no longer the slave of circumstances, and not obliged to await anxiously the efforts of nature. In short, he is master of the position, and determines beforehand what, under the requirements of the case, shall be the period at which the patient shall find herself free from the dangers of childbirth, and can confidently inform her when her anxiety shall be over." (Barnes.)

In more than one respect we are obliged to differ from Dr. Barnes, though his instrument seems calculated to be of real service. We used it successfully in a case of induced abortion in which the labor was too tedious. It certainly, in this instance, very much hastened the moment of delivery.

D. IRRITANTS PLACED BETWEEN THE WALLS OF THE UTERUS AND THE OVUM.

Detachment of the Membranes.— This operation is accredited to Hamilton, who, in the year 1800, proposed passing the finger forcibly through the neck and internal orifice of the womb, and detaching the membranes as far as practicable. He had observed that when the ovum becomes separated for a considerable extent from the wall of the uterus, its expulsion necessarily ensues very soon. His process, however, was so rough, violent, and often impossible, especially in first pregnancies, that it was soon abandoned.

Mampe, and subsequently Pfenninger, Billeter, and Campbell, thinking that an instrument capable of being inserted more easily than the finger, might be substituted for it, proposed the use of a gum-elastic bougie, with its extremity rounded in order to avoid rupturing the membranes. The operation would seem to be of easy performance and free from danger to either mother or child.

Other accoucheurs have made use of sounds of horn or metal, for the purpose of detaching the membranes.

In 1848, Professor Lehmann (of Amsterdam) recommended that a bougie of medium size be passed into the uterus to the distance of eight or ten inches, and immediately withdrawn; the operation to be repeated until labor is fairly begun. His idea is that the double object of detaching the membranes and stimulating the uterus to contraction is thus obtained. In 1852 he published eight successful cases, in one of which the bougie was twice inserted, and three times in another. The duration of the labor was from one to five days, and the delivery accomplished favorably to both mothers and children. This plan was favorably received in England, and is still frequently used there. Its simplicity and easy execution give it a claim to consideration, though it is far from being as certainly and promptly effectual as in the cases reported by Lehmann.]

Cohen's Method.—Ought we to attribute any greater value to the uterine injection, recently proposed by Dr. Cohen, of Hamburg, for the artificial induction of premature labor? Experience can alone determine the question. His process is, however, so simple, and, according to the author, is attended with such prompt effects, and is so devoid of danger, that we think it right to notice it. He says, "I perform the injection as follows: I use a small syringe, usually of pewter, containing from two to two and a half ounces of tar-water, and whose canula, from eight to nine inches in length, and about the eighth of an inch in diameter, has a curvature similar to that of a female catheter. I lay the woman flat on her back with the feet raised

then, inserting two fingers up to the posterior lip of the os tincæ, I use them as a guide to the canula, which I pass between the anterior wall of the uterus and the ovum to the distance of two inches within the uterus. It is then only that I commence the injection. I force it gently and slowly, taking care to raise the syringe a little to avoid applying the opening against the wall of the uterus, and changing the direction of the instrument whenever any obstacle presents to the passage of the fluid. The syringe is withdrawn very gradually; ten minutes afterward, the woman may rise and walk, and if at the expiration of six hours there is no appearance of labor, the injection is renewed." . . . . . As M. Cohen has succeeded once, and the process is so harmless, it is very desirable that he should try again.

[*Krause's Operation.*— This Professor recommends that a flexible bougie be passed into the uterus to the distance of from eight to ten inches, and left there until the desired effect is obtained. It was done successfully at Gröningen, and it is desirable that its merits be proved and compared with those of the intra-uterine dilator.

Intra-uterine Dilator.— Lastly, I have myself proposed the use of a new instrument, which I call the *intra-uterine dilator*. The principle of its construction is as follows: the insertion through the cervix to some distance above the internal orifice of a gum-elastic tube of the size of a goose-quill, which is so constructed that its end swells out into a bulb of the size of an English walnut, when an injection is forced into it. The apparatus is to be left *in situ* until expelled by the uterine contractions.

The first case in which it was employed was published in the *Gazette des Hopitaux*, January 9, 1862. I then used a metallic tube of medium size, terminated by one of gum-elastic about an inch and a half long. A stopcock, placed near the trumpet-shaped end of the instrument, and a syringe, completed the apparatus, which is represented in M. Charrière's catalogue, published on the occasion of the London Exhibition.

The operation of the instrument is readily understood. The dilator is passed into the neck of the womb until its dilatable portion, that is to say, the part covered with gum-elastic, has got beyond the internal orifice into the cavity of the organ. Then warm water is forced into the tube, the gum swells out into a ball, the stopcock is closed, and the apparatus keeps its place without a bandage, being prevented from slipping out by the dilated extremity of the instrument.

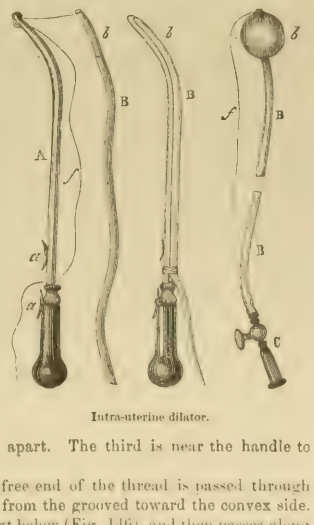
The direction assumed by this dilator, when *in situ*, is nearly that of the uterus, the metallic stem emerging from the vagina at the posterior commissure of the vulva, and projecting behind the thighs. This sort of caudal appendage was so inconvenient that the women could neither lie on the back nor be seated without the risk of suddenly displacing the instrument. This great defect was remedied by cutting off the metallic tube about two inches below the gum. To the end of this segment is adapted, on the one hand, a movable handle, which can be withdrawn when the instrument is applied, and, on the other, a flexible tube which traverses the vagina and is fitted externally with a stopcock to which the injecting syringe is adjusted. With this alteration, the women may assume any position, lie down or walk about, without inconvenience or danger. This last instrument is the one which I exhibited before the Academy of Medicine in November, 1862, and is figured in the report of the *Gazette des Hopitaux* of the same month.

I now use an instrument which is more complete and simple, although at first sight it would seem to be quite complicated. It is composed of two fundamental parts; a gum-elastic tube and a conductor.

1. A gum-elastic tube, of the size of a goose-quill, about a foot long and closed

at one end (Fig. 146, B). This tube is thick and resisting in the greater part of its length (Fig. 146, D), but its walls grow thinner toward its end for the space of from an inch and a quarter to an inch and a half. (Fig. 146, *b*). When an injection is forced into it, the unequal thickness of the walls causes the thin part to become dilated. (Fig. 148.)

To the end of the tube (Fig. 146), a cord about eighteen inches long is attached, strong and small; the best for the purpose that I know of being what the women call "soutache," of white silk. This thread being very liable to slip, in order to prevent it, I drop into the end of the tube two shot soldered together, and am careful to tie the thread exactly in the groove between them. When this is done, the thread always holds. The other end of the tube is fitted with a socket provided with a stopcock (Fig. 148, C), for the reception of the injecting syringe.



Intra-uterine dilator.

2. A metallic conductor with a blunt extremity grooved through its entire length, and curved like a hysterometer. (Fig. 146, A.) A tolerable idea may be formed of it by imagining a male catheter cut in half, lengthwise, and the convex portion removed. This conductor is pierced with three holes for the passage of the thread. The two first are near its end, and about three-eighths of an inch apart. The third is near the handle to which the conductor is attached.

To adapt the tube to its conductor, the free end of the thread is passed through the eye nearest the end of the conductor, from the grooved toward the convex side. It reënters the groove through the eye next below (Fig. 146), and then passes along it through its entire length, coming out again through the eye near the handle. When the string is drawn tight, the upper end of the tube fits into the end of the conductor, and is held there by fixing the string by means of a string provided for that purpose. (Fig. 146, *a*.) The body of the tube is next placed in the groove, and made fast by a few turns of the remaining portion of the string. Lastly, the end of the string is secured by passing it beneath the spring already mentioned. (Fig. 147.) The entire apparatus, when mounted, is not longer than a common catheter. (Fig. 147.)

The instrument is used as follows: When the tube has been provided with its string, an experimental injection is made into it, in order to ascertain whether a crack or other opening exists in it. This having been accomplished, the tube is held vertically, with the stopcock uppermost and open. A few bubbles of air are first discharged, followed by water, which is allowed to flow away. When the tube has resumed its usual size, it collapses; that is to say, the air has been expelled, and the stopcock is closed, to prevent any more from entering. This precaution is taken, lest any air should be forced into the uterus, in case the gum-elastic bulb should happen to burst.

The tube thus prepared is next adjusted to the conductor in the way above described. To lubricate it, glycerine should be used, because fatty matters alter the gum very quickly, and cause the apparatus to rupture.

The woman being placed across the bed, with the hips raised and projecting over the edge of the mattress, the legs being held apart by two assistants, the operator passes two fingers of the left hand into the vagina, and places the end of the forefinger upon the os tincæ. The dilator, held in the right hand, is passed into the vagina; its extremity is guided into the cervix, and by depressing the handle, it usually passes without difficulty into the uterus, going between the ovum and the anterior wall of the womb. It ought to go an inch and a quarter at least beyond the internal orifice; a small projection upon the conductor, four inches from its end, serves as a guide.

The instrument is held in position whilst the turns of the string which hold the tube to the conductor are unwound. An assistant fills a syringe with warm water, expelling the air, and inserts its tube into the socket which hangs outside of the vagina. The injection should be made very slowly, though it requires considerable force, especially at the outset. A little more than an ounce and a half of liquid is sufficient to swell the gum-elastic bulb to the proper size. When the injection is completed, the stopcock is closed, the string is detached from the spring which holds it, and the conductor is easily withdrawn by gentle traction. The tube being held by the bulb at its extremity, remains with the string hanging beside it.

It only remains to take measures for preventing the stopcock from opening, and to attach it to a simple or body bandage. I prefer, however, merely to tie the tube securely at the vaginal orifice, and remove the stopcock altogether. The women being then free from any impediment to motion, are free to move about their chamber and engage in their usual occupations. It is even preferable that they should keep up, for then the gum-elastic bulb presses directly upon the internal orifice, and labor commences earlier.

The pains sometimes come on whilst the instrument is being applied, though, on an average, they do not begin until three or four hours after operating. At first, they are feeble, but become gradually stronger and nearer together, as in natural labor. The cervix becomes effaced and opens out, until at last the instrument falls into the vagina. This expulsion generally takes place in ten or twelve hours, though sometimes much sooner or rather later. Statistics of all the operations I expect to give hereafter.

By the time the dilator is expelled, the neck of the uterus has become effaced, is widely open, and the membranes are projecting through it. In the majority of cases, the labor continues, but sometimes it ceases. I have often remarked that it was only necessary to make the women walk about, and to leave the instrument in the vagina, where it doubtless acts, like Braun's colpeurynter, to make certain the continuance of the contractions. When, notwithstanding all these precautions, the labor stops, it becomes necessary to introduce the dilator again, giving it, this time, a larger size.

Once only, in a case of M. Depaul's, was this plan ineffectual; whenever the instrument was expelled from the uterus into the vagina, the labor ceased. M. Depaul was obliged to rupture the membranes, and even then his patient was not delivered until a long while after. I am satisfied that in this case success would have quickly followed the use of Barnes' instrument immediately after the dilator was expelled. I even think that it would oftentimes be very useful to associate these two instruments, on account of the impulse which they would give to the progress of the labor, and that their conjoined use is destined to be a real step in advance in the induction of premature delivery.

I attribute the efficiency of the dilator to a special property of the uterus, in virtue of which it tends to contract, in order to expel a foreign body within it. It also acts by detaching the membranes, though here less decisively, since it seems to be shown by some of my cases that the labor stops when the instrument is withdrawn too soon, although detachment of the membranes had resulted from its application

Having by this time had quite a large experience, I am justified by the facts in saying that there is no difficulty in the operation, as will be attested by Drs. Danyau, Depaul, Pajot, and Blot, all of whom have frequently performed it successfully. It is, besides, entirely innocent as regards both mother and child, and far more certain and rapid than any other process. A no less great advantage is its extreme simplicity as compared with the difficulties met with in the use of the prepared sponge and uterine douches. It is also completed at one time, and in exceptional cases only has it to be repeated; when the instrument is once applied, there is nothing to be done but to await the delivery.

It would have been thought, *à priori*, that this process would be liable to rupture the membranes, but it will suffice to say that in twenty cases it did not happen. A more valid objection is the possible rupture of the gum-elastic bulb. This occurred four times in the first ten recorded cases; but since then, having used an improved dilator, I have known it to occur but once. The result was an involuntary injection into the uterus, as in Cohen's process, giving rise neither to pain nor accident of any sort; the operation being merely interrupted for the time required to adjust to the conductor another tube, which it is always well to have on hand in case of accident.

The only serious fault to be found with the intra-uterine dilator is, that in some rare cases it would be impossible to introduce it into the uterus. Should the head be very low down, or the neck much deviated, insurmountable difficulties might be met with. Whilst acknowledging the objection, I would only observe that it applies equally to the various processes of detachment of the membranes, Cohen's intra-uterine injections, and to all the methods of puncturing the membranes.]

E. Puncture of the Membranes.

Usual Method.—Puncture of the membranes is certainly the surest of all the processes and the one most likely to be the first to suggest itself. It was performed by Macaulay when, for the first time, he acted on the advice given in 1756 by the most celebrated physicians in London. Most accoucheurs who have performed this operation since his day have likewise punctured the ovum; the various modifications suggested at different times merely refer to the shape, the length, or the curve of the instrument used, and scarcely merit a notice. For it must be evident that any canula whatever that is sufficiently curved to correspond with the line of the pelvic axis, and is long enough to reach the os uteri without difficulty—that is, about eight to eight and a half inches—, and furnished with a trocar, having its point concealed within, or only projecting a few lines beyond the end of the canula, will be all that is requisite. The only precautions to be observed consist in guiding the instrument along in such a way as not to injure the mother's parts, and so as not to wound the fœtus by the point of the trocar.

As elsewhere stated, this is the most certain plan, because a discharge of the waters necessarily occasions a retraction of the uterine walls, and sooner or later a manifestation of the pains; we may further add, that it is quite as easily accomplished, and is less painful to the mother than those about to be described; but we must acknowledge that the child's existence is much more endangered, because a partial or even a total escape of the amniotic liquid is not always followed at once by the occurrence of the first pains.

Sometimes forty or even sixty hours elapse before the uterus, irritated by the prolonged contact of the fœtal inequalities, begins to contract; and even when the labor has actually commenced, the dilatation of the os uteri pro-

gresses very slowly, for at the seventh or eighth month the fibres in the neck have not as yet undergone those modifications which, at the ordinary term of gestation, render the dilatation easy; and thus a further period of twenty-four or thirty-six hours often passes away before the os uteri is sufficiently dilated. Now, during all this time, the fœtus, being no longer protected by the amniotic liquid, is subjected to the direct pressure of the contracted uterine walls; the umbilical cord might very easily be involved, and from its compression, an interruption of the circulatory relations, which are indispensable to the support of the child's life, would inevitably result; besides which, the placenta itself might be partially detached in consequence of the retraction of the womb.

Many accoucheurs, influenced by these palpable dangers, had altogether rejected the perforation of the membranes, when a modification was proposed by Meissner, of Leipsic, which fortunately prevents the accidents just indicated, and therefore merits a further investigation into the propriety of puncturing the ovum. Various plans were suggested for moderating, as it were, the discharge of the amniotic liquid, and of only permitting the escape of a sufficient quantity of it to secure the induction of the pains; but no one had hitherto succeeded in accomplishing what Meissner has so happily effected. His process is as follows:

Meissner's process. — Instead of puncturing the bag of waters at its lowest part, he perforates it high up close to the fundus of the womb, by using an instrument consisting of a canula and two stylets. The canula, which is made of silver, is nearly thirteen inches long, and about two lines in diameter; and it is curved so as to correspond to a segment of a circle which has a radius of eight inches. A ring is attached to it, near the lower extremity on the convex side, by which the instrument is managed, and which serves to indicate the direction of the curvature after the introduction. The two stylets (one being terminated above by an olive-shaped button, and the other by a trocar) are adapted to the canula; their lower end is flattened out so as to keep them from slipping in too far; the olive-shaped extremity of the first stylet ought not to project more than two or three lines beyond the canula; but the trocar point of the second should advance at least half an inch. The first stylet is intended to facilitate the introduction of the canula, and the second to make the puncture.

M. Meissner performs the operation in the following manner: The patient is placed in an erect posture, and the operator, stooping down on one knee before her, first ascertains the exact position of the cervix; if this is high up, and at the same time is directed so far backwards as scarcely to be reached, the patient will have to sit down on the edge of a chair, or else lie on a settee. The accoucheur then introduces the canula armed with the blunt stylet, along the palmar surface of the index finger into the cavity of the cervix, and presses it on until it has passed the internal orifice; of course, always having the convexity of the instrument directed towards the hollow of the sacrum. When the point of the canula has once got beyond the internal orifice, it is easily slipped up between the membranes and the uterine walls, to the extent of eight or ten inches above the os uteri. After having ascertained that the point of the instrument does not rest on any

portion of the fœtus, the accoucheur withdraws the olive-shaped stylet, and substitutes the trocar, with which he then punctures the membranes. The trocar is next withdrawn, a small quantity of liquid is allowed to escape through the canula, and then the latter itself is removed. After the operation is over, the woman may be permitted to sit down or walk about at pleasure. The waters gradually escape, thus lubricating and preparing the passages, and the pains make their appearance in the course of twenty-four or forty-eight hours; and, in most cases, the dilatation is soon effected, the contractions are strong, and the labor is completed in thirty-six or forty-eight hours. When the labor does not advance regularly, and the resistance from the contracted pelvis is very considerable, M. Meissner resorts to the measures usually employed under similar circumstances at term.

He has tried this mode of operating fourteen times, and he avers that both mother and child were saved in every instance; such a result, as compared with those obtained by other plans, certainly demands attention, and must encourage other practitioners to attempt it. Let us hope that the principals of large lying-in hospitals will shortly confirm, by fresh success, the favorable accounts given by Meissner.

The introduction of Meissner's canula is liable to occasion a partial separation of the placenta, and consequently endangers the lesion of some of its vessels. This, indeed, happened in a case observed by Kivisch, of Würzburg: the canula would ascend no higher than five inches, and after the puncture, nothing escaped but a little blood and serum. Not having obtained a discharge of water, it was decided two hours afterwards to puncture the ovum in the usual way. . . . Why not have directed the canala toward another point?

[M. Villeneuve (of Marseilles) substituted for Meissner's double mandril, a single one ending in a hook for seizing and rupturing the membranes. Whilst this instrument has all the advantages of the trocar, it is not liable to wound the child.

Whatever instrument is used to accomplish it, perforation of the membranes at a point high up has afforded good results, inasmuch as out of twenty-four cases recorded up to this date, all the patients survived, and twenty-two children were born alive.

Meissner's method is little used, probably because of a fear of penetrating so deeply into the womb and of wounding its walls or the fœtus, or of separating the placenta. It will always be an exceptional operation.

Appreciation.

The means by which labor may be brought on prematurely are, as has been seen, very numerous and have all been used with various degrees of success due not merely to the nature of the process adopted, but also to the great difference in the degree of excitability of the uterus in pregnant women. Sometimes the slightest cause will bring on contraction of the womb, in which case any process will succeed admirably; at other times it will remain completely inert under the most active stimulation, and then the very best methods become apparent failures.

The best operation is that which is the most uniformly and rapidly successful, at the same time that it affords the greatest security to both mother and child. Apart from special indications, which the clinical history of a case may supply, there are three operations to which we should accord the preference: 1, detachment of the membranes; 2, dilatation of the cervix; 3, stimulation of the circumference of the os uteri.

1.— We would practise *detachment of the membranes* whenever the internal orifice can be entered.

2.— We would perform *dilatation of the cervix*, when it is impossible to pass the instruments through the internal orifice.

3.— *Stimulation of the circumference of the os tincæ* would be our last resort, when the two preceding methods are found to be impracticable.

We have next to compare the processes included in these three methods; but not wishing to repeat here what has already been said in describing each operation, we would call attention more especially to the *intra-uterine dilator, Krause's permanent sound, the prepared sponge*, and *uterine douches*.

To have succeeded in bringing on labor prematurely does not limit the accoucheur's responsibility: he has yet to devote much attention to the child whose imperfect development demands especial care, which is necessary in proportion to the earliness of the period at which the pregnancy shall have been interrupted. Children born at term are brought up under ordinary conditions, but those born before term require unusual precautions, upon whose proper execution success must depend. With them they often live, but without them they are almost sure to perish.

All children born prematurely require the most careful protection from cold, so that, beside the usual clothing, the whole body, the head and limbs especially, should be enveloped in a layer of corded cotton. Bottles of hot water ought also to be placed in the cradle as a permanent source of artificial heat. The temperature of the chamber in which they are kept should be maintained at about 64 degrees (Fahrenheit). If, notwithstanding all these precautions, the circulation languishes in the integuments, and the subcutaneous cellular tissue becomes infiltrated, stimulating baths, the best of which are made of wine, should be used. From time to time the children ought to be exposed naked before a warm fire, and the occasion taken to rub gently the entire surface of the body with the hand.

Their proper nourishment is not less important. It is indispensable for them to be suckled, either by the mother or a wet-nurse. When strong enough to take the breast, it is only necessary to nurse them often, but when too weak or lethargic for this, they should be made to swallow the milk previously expressed from the breast into a dessert-spoon. This ought to be done twelve or fifteen times a day, two or three spoonsful at a time being as much as they will require for the first few days. The quantity will afterwards be increased gradually, until the child is strong enough to take the breast. To the combination of all these attentions very many children born before term owe their lives; their omission almost always results in death.]

CHAPTER VII.

PRODUCTION OF ABORTION.

PREMATURE artificial delivery requires, as just seen, certain dimensions in the diameters of the pelvis; but when the contraction is so great that the smallest diameter is less than two inches and a half, a question of the highest interest presents itself, namely, that of the production of abortion.

When a woman, three to four months pregnant, has so contracted a pelvis as to preclude all hope of a possible expulsion or extraction of a viable fœtus, may we think of inducing abortion? This question, put to Dr. Hunter, in 1768, by W. Cooper, was shortly afterward decided in the affirmative by most English practitioners. The propriety of the operation was also acknowledged in France, by Fodéré (1813), Marc (1821), Velpeau

(1829), and by ourselves (in 1840), in the first edition of this work. In 1843, M. P. Dubois published an article in the *Gazette Médicale*,—an article which foreshadowed his opinion, although it did not positively express it. About the same time, M. Simonard, of Brussels, published a dissertation, in which, after showing the morality of the operation, he points out the indications. Finally, MM. Stoltz, Jacquemier, and Chailly, have adopted the views of the English accoucheurs.

Too many imposing authorities have pronounced in favor of producing abortion to make it necessary for us to stop in order to discuss the moral, religious, and medico-legal questions which this operation has raised.[1] Like premature delivery, it is now received as an obstetrical operation, and it only remains for us to determine the indications, and the most expeditious and least dangerous means of accomplishing the object.

1. The extreme contractions of the pelvis, those which afford the woman at the term of her gestation only the sad choice between embryotomy and the Cæsarean operation, and for a still stronger reason, those which, by affording less than two inches to two inches and a half, allow of the extraction of a dead or living fœtus *only* by incision of the abdomen, constitute the most positive indication for producing abortion. If, indeed, as we shall endeavor to prove in the following chapters, the sacrifice of the child is fully justifiable when the choice only lies between hysterotomy and embryotomy, this sacrifice would be still more rational at a period of gestation in which the operations necessary to the production of abortion are much less dangerous than those which the mutilation and extraction of a fœtus at term would require. For our own part, therefore, we think that the accoucheur is warranted in producing abortion, whenever a woman, who is five or six months pregnant at the most, shall have less than two and a half inches in the smallest diameter of the pelvis.

2. Contractions of the pelvis are not the only cases in which it has been proposed to produce abortion. A host of accidents connected with the pregnant condition, and a multitude of coexisting morbid phenomena, all becoming very dangerous to the mother in consequence of this coincidence, have appeared to some physicians to be quite as rigorous indications as the pelvic contractions. We cannot partake of this view, at least as respects the majority of cases. The precepts laid down by us in treating of *premature delivery*, require to be greatly modified when *abortion* is concerned. In a grave case, indeed, but one in which the issue is only *probably* favorable, we may conclude to induce labor after the seventh month: the danger to which the mother is *probably* exposed certainly legitimizes an operation which affords considerable chance of saving the child's life. The same is by no means the case as respects the production of abortion: here it is no longer sufficient that the mother's life is *probably* compromised, it should be *almost* certain that death is imminent. Under this head, hemorrhages that have resisted all kinds of treatment, irreducible displacements of the womb, extreme dropsy of the amnion, tumors of the soft parts which cannot be displaced, punctured, incised, or extirpated, seem to me to be the only ad-

[1] For further details, see M. Cazeaux's report to the Academy of Medicine, and the discussion which followed it. *Bulletin de l'Académie de Médecine*, 1846.

missible indications for the production of abortion. The same may be said of those cases of obstinate vomiting which threaten a speedy termination of the mother's life (see page 477.) On the contrary, it ought not to be performed for nervous disorders, and chronic or acute diseases complicating gestation. As regards eclampsia, it is rare in the first half of pregnancy, and the slowness with which the abortive measures act at a very early period, seem to me to be a formal contraindication. (See p. 813.)

To recapitulate, extreme contractions of the pelvis, voluminous, immovable, and non-operable tumors of the excavation, extreme dropsy of the amnion, irreducible displacements of the womb, and hemorrhages which have resisted the employment of the most rational measures, we consider to be the only indications for abortion. Some authors have admitted a greater number, but only for want of distinguishing clearly between abortion and premature labor.

The only contraindication is the formal refusal of the mother; for with her alone, after all, remains the right to decide the question.

Whilst respecting the scruples of certain minds as respects a deformed woman upon whom abortion has been once practised, I confess that it would not deter me for an instant in a succeeding pregnancy. We have no right to constitute ourselves judges of the morality and of the antecedents of the patient who demands our assistance. Even supposing that we have to do with one of those unfortunate creatures who will trample under foot the most sacred feelings, and give way all the more to their passions, because they think they can find impunity for their bad conduct in the humanity of the surgeon, we owe her none the less our care; for us, the only question to resolve in the second, or third, as in the first pregnancy, is, whether the conformation of that woman allows us to hope for the extraction of a viable child.

It, therefore, only remains for us to determine the period at which it is proper to operate, and the most advantageous methods.

None but the contractions or obstructions of the pelvis permit the accoucheur to choose the most favorable moment, and then the only precaution to be observed is to wait until the pregnancy can be certainly determined, that is to say, between the fourth and fifth months. In all other cases, it is necessary to act as soon as the gravity of the accidents have no other alternative.

[*Modes of Operating.* — All the methods described for the induction of premature labor may be employed; but inasmuch as during the first half of gestation the womb is but slightly contractile and susceptible of stimulation, the most active means should be preferred. The use of the tampon, after Schœller's or Braun's plan, is often ineffectual; the prepared sponge, although more efficient, is liable to act with the most discouraging slowness, and the same may be said of Kiwisch's injections. The two plans which seem to us the most likely to succeed are, detachment of the membranes and puncture of the ovum.

Detachment of the Membranes. — This is generally done with a metallic sound, which is passed over as great a surface as possible. Although the operation is, apparently, very simple, it is often really very difficult, and the most skilful hands have sometimes been unable to perform it.

We produced abortion three times by means of the intra-uterine dilator; once for

ao
ml
B

PLATE X.

Blood Vessels of the Female Pelvis.

The Uterus is drawn up and the Fallopian tubes displaced on to the Iliac Fossæ. The infected vessels are viewed from the front of the Pelvis. The anterior part of the bony Pelvis, the upper portion of the Bladder and part of the anterior Vaginal Wall have been cut away.

a. o. Abdominal Aorta, dividing into the Common Iliacs, and then again into the External and Internal Iliacs. *B.* Bladder. *r.* Rectum. *ut.* Anterior Surface of the Uterus. *Ft.* Fallopian tube. *c.* Cervix Uteri (Vaginal portion). *g.* Corpus Cavernosum of Clitoris. *g'* Body of Clitoris. *rl.* Round Ligament. *utr.* Uterine Artery crossing Ureter (*u*). *V.* Vagina.

obstinate vomiting, and twice on account of extreme contraction of the pelvis. In the first case, the abortion was effected in a few hours, and the patient recovered. In a second (contracted pelvis), it was over in less than forty-eight hours. This last case has especial value from the fact that Prof. Dubois had the greatest trouble in a previous pregnancy in producing abortion; douches in great number had been given without result, several applications of prepared sponge had been fruitless, and expulsion of the ovum was only brought about by introducing large bougies into the uterus.

The third case of abortion, provoked by the intra-uterine dilator, was both less perfect and less rapid; the patient being a woman affected with osteomalacia. The dilator was used without difficulty or pain during the fifth month of gestation. Five days afterward the cervix was, in great measure, effaced and partly opened, but the instrument still remained within the womb. To stimulate the labor I used Barnes' dilator, and soon afterward the abortion took place.

In these three cases the patients recovered without accident, so that the results were sufficiently satisfactory to authorize its use in the future.

Puncture of the Ovum. — As an operation for the induction of premature labor, puncture of the ovum, notwithstanding the certainty with which it acts, is liable to the great objection of compromising the life of the child, and on this account it is almost entirely abandoned. But, as in case of abortion the fœtus is not viable, puncture of the membranes is a valuable method. The only objection to it is the difficulty of certainly reaching the ovum. The method is the same as for premature labor.

Whatever means are employed, it is to be expected that the expulsion will take place very slowly. This will seem reasonable, inasmuch as spontaneous abortion is usually very tardy.]

CHAPTER VIII.

OF SYMPHYSEOTOMY.

The relaxation of the pelvic symphyses, and the consequent separation of the articular surfaces, which often occur during pregnancy, have so long been known to the profession, that it is somewhat surprising the operation in question was not sooner suggested. It should be stated, however, that certain reflections, and even some facts well worthy of attention, are scattered here and there throughout the annals of our science. For instance, Severin Pineau, when treating of the relaxation of the pelvic ligaments, quotes the text of Galen, and seems to anticipate the Sigaultian operation; since, in speaking of the pelvic articulations, he says, *Non tantum dilabare, sed etiam secari tuto possunt.* In a work published by Delacourvee, a French physician, in 1655, we find that, being summoned to a pregnant woman, who died near full term, he divided the pubic symphysis with a razor, in order to extract the child more readily. In 1766, Plenck, under very similar circumstances, first performed the Cæsarean operation; but, being unable to extract the head, which was low down in the excavation, he divided the symphysis, and was successful in delivering the child. But this early attempt, instead of leading to the performance of this operation on the living female, seemed to have the opposite effect.

In fact, it was only towards the end of the last century (in 1768) that Sigault, then a student of medicine, suggested it to the Academy of Sur-

gery, by whom it was rejected as a rash proposal. Not disconcerted by this reception, young Sigault supported his invention in a thesis at Angers, in 1773; that is, five years after the presentation of his original memoir; and, finally, in 1777, he performed his first operation, assisted by Alphonse Leroy, who declared himself its zealous partisan. The mother and child were both saved; and, on account of his success, Sigault, who had been almost reviled by the Academy of Surgery, was thenceforth covered with honors, and regarded as a benefactor of humanity. The Faculty of Medicine at Paris even resolved to celebrate this wonderful discovery by having a medal struck in honor of its author. But, notwithstanding its early success soon gained him numerous followers, it also stirred up new and bitter adversaries: and the medical world was for a long time divided into two sets of enthusiasts, the *Symphyseans* and the *Cæsareans;* but, after their first ardor had abated, both parties finally settled down in a common opinion, as soon as they discovered that there had been exaggerations on each side. Since that time, the Cæsarean operation and symphyseotomy have been alike regarded as useful operations, applicable to certain particular cases; and, so far from attempting to exclude either, the more modern writers have rather endeavored to designate the conditions requiring their respective employment; which, indeed, would have been the wiser course at the time of its first discovery.

§ 1. Effects of Symphyseotomy.

Supposing the propriety of the section of the symphysis pubis to be admitted for the moment, let us ascertain what advantages could be derived from it. From the best works published on this subject, it would appear that we cannot hope to gain more than four to six lines in the length of the antero-posterior diameters of the superior strait and excavation. After a division of the inter-pubic cartilage, the bones of the pubis separate spontaneously from four lines to an inch; which separation is produced by the retraction of the ligamentous fibres, known as the posterior sacro-iliac ligaments. While this is being effected, the coxal bone may be considered as a lever of the first kind, having its long anterior arm bent near the middle; the centre of movement, or fulcrum, is found at the posterior part of the articular surface of the sacrum. During the separation, the ligaments situated on the front part of the sacro-iliac articulation become tense and stretched, or even lacerated, when this is carried to a high degree; consequently, the amount of their resistance greatly influences the degree of separation. Again, if the accoucheur, by taking hold of the iliac crests, attempts to draw them asunder, he may considerably increase the interval already existing between the pubic bones; but it would be imprudent to carry this artificial separation too far; because, if carried beyond two inches, the anterior sacro-iliac ligaments would probably be ruptured, and the mother be subjected to very serious consecutive inflammations. The antero-posterior diameter of the strait is increased from two to three lines for every inch of separation between the pubes; and, since this interval may amount to two inches, four to five lines are therefore added to the length of the sacro-pubic diameter. In addition to which, the anterior parietal protuber-

ance, by engaging in the space left between the pubic bones, diminishes the biparietal diameter to a corresponding extent; and it has been calculated that two to three lines are gained in this way; which would give a sum total in the increased length of the sacro-pubic diameter of six to eight lines.

But the sacro-pubic is not the only diameter augmented by symphyseotomy; for the oblique, and more particularly the transverse, ones are thereby greatly enlarged. In fact, the researches of Desgranges would seem to prove that the increase in the transverse direction, throughout the whole pelvis, amounts nearly to one-half of the separation at the pubis; and that the transverse enlargement of the pubic arch is almost equal to the whole of this interval. Whence it follows that the operation, which would appear to be applicable to those cases only in which the contraction affects the sacro-pubic interval, is in reality especially advantageous when the transverse diameters of the excavation, or of the inferior strait, are shortened.

§ 2. Indications for Symphyseotomy.

The results furnished by experiments made on the dead body, naturally lead to the conclusion that this operation is practicable whenever five to eight lines, added to the contracted diameters, would prove sufficient to admit of a spontaneous delivery, or, at least, of an extraction of the fœtus by the forceps. Such is the view adopted by most practitioners since the days of Sigault, and the extremes of the operation have been limited to two and a half inches for the lowest, and three and a quarter inches for the highest. But, at the present day, symphyseotomy is seldom resorted to, and it will be even less so hereafter, when accoucheurs generally shall have learned to appreciate the advantages derivable from the induction of premature labor.

The circumstances that have led to the performance of the Sigaultian operation, are equally strong in favor of the induction of premature labor; and the results deduced from experience, the only impartial judge in such cases, have already decided in behalf of the latter operation. For, whenever a patient comes under care during the last two months of her pregnancy, whose pelvis ranges from two and a half to three inches in its smallest diameter, we ought to bring on the labor before term; more particularly if a mutilation of the fœtus has been deemed necessary in a former confinement; and, on the other hand, we have elsewhere shown (page 672) that, whenever there is reason to believe that the child's life is more or less compromised by the previous duration of the labor, and the unsuccessful attempts resorted to for its extraction, the accoucheur should act as if it were really dead. Hence symphyseotomy should only be performed, even though the pelvis measures from two and a half to three inches in its smallest diameter, when the operator ascertains the existence of the deformity before the membranes are ruptured.

For, even admitting that it were not better to sacrifice the infant's life than to perform an operation which so often endangers the existence and commonly the health of the mother, is it always possible, in practice, to conform strictly with theoretical principles? The cases in which a similar degree of retraction has permitted the spontaneous expulsion of the fœtus

naturally suggest themselves to the mind; and although these exceptions to the rule are certainly rare, yet they may reoccur. Consequently, is it not prudent, before alarming the patient, to ascertain, by a proper delay, the inefficiency of the uterine efforts? Is not such a delay indispensable for proving the necessity of the operation? In most instances, would it not require several hours to induce the patient to yield to the entreaties of her family? Would the relatives themselves consent, before the lapse of time had convinced them of the absolute impossibility of a natural delivery? And would they not demand a trial of all other means, before a resort to such an extreme measure? Could the accoucheur object to an application of the forceps, which has so many times, under like circumstances, been followed with success? Or could he refuse, had he, like ourselves, seen a living fœtus expelled at term through a pelvis whose antero-posterior diameter measured but three inches? These uncertainties, hesitations, and forced delays, which a firm and resolute physician having charge of an hospital may escape, are inevitable in private practice, where we have the fears of the family, the resistance on the part of the patient herself, and oftentimes the anxiety caused by the jealousy of some of our own brethren, to contend with; during all which, time runs away, the labor is progressing, the membranes are ruptured, and the favorable chances for performing the operation are lost. It will be said, *perhaps* the slowness of the labor is more dependent on the feeble contractions than on the disproportion between the diameters of the head and those of the pelvis; or, *perhaps* a little artificial aid joined to the powers of nature will succeed in accomplishing her work. But while thus wavering from hope to hope, from *perhaps* to *perhaps*, the labor reaches that stage where we begin to doubt the viability of the fœtus; and, when such a doubt arises, can we any longer think of resorting to symphyseotomy?

This operation has been proposed in other cases, besides those dependent on a contraction of the pelvis; as, for instance, for tumors in the excavation, for a very large head, or a retroversion of the womb, occurring during the early months of gestation. Thus, it was resorted to by Duret, in order to overcome an obstacle to the engagement of the head, created by the development of an exostosis, about the size of a nut, on the first false vertebræ; as also in the following case, published by Dr. Damman, in Casper's journal: A woman had been three days in labor, but the head was so voluminous that it could not engage in the excavation, notwithstanding the perfect conformation of the pelvis; and, having become wedged in the superior strait, an application of the forceps was impossible. Although the long duration of the labor ought naturally to have created some doubt with regard to the child's condition, yet M. Damman resorted to symphyseotomy; the infant was born dead, but he was fortunate enough to save the mother.

The remarks before made with regard to this operation in cases of deformed pelvis, equally apply to those of tumors in the excavation, and to those in which the excessive size of the child's head constitutes the only obstacle to a spontaneous delivery. As to its utility or disadvantages when resorted to for the purpose of facilitating the reduction and correction of a retroverted uterus, experience is still wanting.

In our estimate of the indications for this operation, we cannot conform,

as the reader will see, to the rules laid down by its partisans, because, so far from being precise and positive, as they suppose, these rules only leave the practitioner in doubt and uncertainty. Laying aside for a moment all theoretical discussions, and looking at the question only in its practical point of view, we are led almost irresistibly to the conclusion that, in the present state of our science, symphyseotomy is no longer practicable. For, independently of the difficulties in determining its indications precisely, it must not be supposed that the operation is attended with as little danger as Sigault and Alphonse Leroy endeavored to prove; and we only need refer to the numerous accidents thereby produced to sustain the justice of our conclusions. In fact, these dangers are so great that, according to Baudelocque, of forty-one females operated upon, fourteen died, and thirteen children only were born living! Not to allude to the numberless infirmities that embittered the existence of nearly all the patients who survived the operation.

Operation.—This is very simple. The woman, being placed in the same position as if the forceps were to be applied, is properly supported by assistants; the bladder is emptied, and the catheter left in the urethra for the purpose of protecting this canal from the edge of the knife, by pressing it towards the right side. The operator depresses the skin covering the pubis, so as to find the precise spot for cutting down on the symphysis. This being done, an assistant stretches the skin upward as much as possible, and the surgeon then makes an incision through the soft parts, commencing about half an inch above the symphysis, and prolonging it downwards over the centre of the articulation, nearly to the clitoris, and terminating a little to the left; the inter-pubic ligament is then carefully incised, and, when it is nearly cut through, great precaution is requisite not to wound the bladder. As soon as the section is effected, a separation of the pubes follows; when, if the patient's strength is not exhausted, and the uterine pains are still strong and frequent, the further delivery is abandoned to nature; but in the opposite case the forceps is applied, or the labor terminated by the pelvic version and by tractions on the lower extremities. After the delivery is completed, the patient is cleansed, and the vessels tied, if any were divided; the pubic bones are drawn together, and the lips of the wound sustained by adhesive strips, charpie, and a compress, and the whole retained *in situ* by a bandage around the body. The symptoms subsequently manifested are to be carefully combated as they arise. The perfect consolidation of the symphysis is seldom completed under three or four months, even in the most favorable cases, and instances have been known where this never occurred, though the patients were ultimately enabled to walk, by the formation of a cellulo-fibrous tissue; which, says Alphonse Leroy, by filling up the space in the symphysis, restores the solidity of the articulation.

This process is the one generally followed; but numerous modifications of it have been suggested, most of which are intended for the better protection of the urethra; though none of them, however, are of much value. Attributing the consequences that follow in the train of symphyseotomy to the exposure of the articular surfaces and the lips of the wound to the external air, M. Imbert, of Lyons, has proposed the division of the inter-pubic carti-

lage, without involving the skin. This procedure is feasible enough; but in our estimation, it can only obviate the smallest part of the consecutive accidents; for the various dangers to which the patient is then exposed, are far less dependent on an inflammation of the pubic symphysis than on the disorders created by the separation of the sacro-iliac articulations.

These remarks apply with equal force to the division of the pubis, which Professor Stoltz advises to be performed by the subcutaneous method. But, after the opinion I have advanced with regard to the operation itself, it seems unnecessary to dilate on the different ways of performing it; I must, however, describe that of the Strasbourg professor, for, although experience has not decided on its relative merits, yet it seems to offer the most favorable chances.

It consists in the division of one of the pubic bones near the symphysis, by means of a chain-saw, without incising the integuments. The skin having been previously shaved, a small opening is made on the mons veneris at the point corresponding with the crest of the pubis, either on the right or left side of the symphysis; a long and slightly curved needle, having the saw attached, is then entered at this opening, and slipped along the inner face of the pubis, grazing the bone, and its point is brought out at the side of the clitoris, between the cavernous body and the descending branch of the pubis from which the latter arises. The handle is next fitted on, and, taking the saw by both extremities, it is moderately stretched between the two hands, and the pubis is cut through by a few strokes. The divided portions of the bone immediately separate, and this separation can be increased almost at will, or it may be effected by the direct pressure of the child's head or trunk. The pubis being divided, one of the handles is removed, the instrument is withdrawn, and the small opening which is left behind heals up without difficulty.

[An article upon *Revival of Symphyscotomy in Italy*, by Dr. R. P. Harris, may be found in *The American Journal of the Med. Sciences*, Jan., 1883, in which full statistics are given and comparison of this operation made with the Cæsarean and the Porro-Cæsarean operations.—Ed.]

CHAPTER IX.

OF THE CÆSAREAN OPERATION.

Hysterotomy, or the Cæsarean operation, consists of an incision through the abdominal and uterine walls, for the purpose of extracting the child.

This section has been recommended in cases where a pregnant woman died undelivered, long before it was resorted to on the living female; and it can readily be traced back to remote sources worthy of credit, without confounding it with the mysteries of the poets, or with the marvels of antiquity. Thus, Valerius Maximus speaks of the posthumous birth of the philosopher Gorgias; and Pliny states that the celebrated Scipio Africanus and Manilius were saved under Numa's law, which interdicted the interment of a woman, big with child, until her belly was opened. This wise and prudent law was received and adopted throughout Christendom, and it still flourishes vigorously in the Roman Church.

The precise period at which the operation was first performed on the living patient remains undetermined. Mansfield, of Brunswick, endeavored to discover indubitable traces of it in the Talmud; but one of his contemporaries has wholly refuted such an opinion. According to M. C. Lage, the first authentic case was reported by Nicolas de Falcon, in 1491; J. Nufer performed it in 1500, as detailed by Gaspard Bauhin; and F. Rousset published a work in 1581, which has since acquired considerable celebrity from the great number of cases it contains, all of which were successful.

The surgeons were so emboldened by Rousset's monograph, that the Cæsarean operation was often resorted to without any indication whatever, and its popularity became so great at one time, that a contemporary Dominican friar, Scipia Merunia, affirms that it was as common in France as blood-letting in Italy. However, a reaction soon took place; for Guillemeau, Paré, Viard, and some other prominent surgeons having failed in their attempts, Marchant succeeded in stirring up his countrymen against Rousset, by founding some virulent attacks on these reverses; and the Cæsarean section would have fallen into oblivion, if Gaspard Bauhin had not come to its aid with fresh proofs in its favor.

The interesting and delicate question of hysterotomy was again contested during the whole of the seventeenth century, and then, as in the preceding one, its advantages and disadvantages were grossly exaggerated; so that the following century arrived without any clear idea having been formed respecting the operation or its value, owing to the total want of probity and justice in the examination of the facts of the case. In 1749, Simon read a remarkable memoir on this subject before the Royal Academy of Surgery; but it was characterized by credulity rather than accuracy. Since that period, most of the works on the Cæsarean operation have merely discussed the indications for its performance; but not one of them unless it is Sacombe's passionate and scandalous dissertation, has attempted to prove the impossibility of its proving successful. Although the favorable are not very numerous, yet there are a few that may clearly be considered as incontestable. In our day, the field for the Cæsarean, as well as for all other obstetrical operations, has been limited; but this is rather to be attributed to the advance of science, and to the eminently practical spirit of the present age.

This operation may be practised on the living female whenever the natural passages through which the child has to pass are so narrow, or so obstructed, that a delivery by the application of the forceps, or by symphyseotomy, is wholly impossible; and when the mutilation of the child itself would not permit its extraction without exposing the mother to the greatest dangers. It may likewise be resorted to for the purpose of saving the infant when the patient dies in the advanced stages of gestation.

§ 1. Cæsarean Operation on the Living Female.

When practised on the living female, the Cæsarean section constitutes one of the most serious operations in surgery; for three fourths of its unfortunate victims have perished. This result, which would probably be still more unfavorable if the same pains had been taken to bring before the public the

unsuccessful, as have been used to circulate the more fortunate cases, is, indeed, calculated to alarm the surgeon who is obliged to contemplate performing such an operation.

All accoucheurs agree in the opinion that, when the smallest diameter of the pelvis does not amount to two and a half inches, a delivery by the natural passages is absolutely impossible; and that we have then only to choose between hysterotomy and a mutilation of the fœtus; it was stated, however (page 646), that M. Depaul mentions two cases in which the children were born alive through a pelvis contracted to two and three sixteenths inches.

Supposing the smallest diameter measures two and one-eighth inches, and it has been positively determined that the child is still alive (for the question is no longer doubtful when there is the least uncertainty on this point), two different measures are presented for our serious consideration, namely, embryotomy and the Cæsarean operation. All the French accoucheurs, including Dubois himself, are in favor of the latter, for he says, "The Cæsarean operation is our only resource, and, therefore, it must be resorted to." (*Thèse*, p. 71.)

We are not ignorant of the importance of this question; and it requires a settled and positive conviction, on our part, to warrant us in deciding it differently from other French authors; but we are sustained by the almost unanimous opinion of the English practitioners, who believe that the child ought to be sacrificed whenever the delivery can be effected by embryotomy. Long ago, we strongly expressed a desire (in the first edition of this work), to see the views of our neighbors more generally disseminated in France, in the following words: "And, as to ourselves, our voice will be against the Cæsarean operation in all cases where it is not absolutely indispensable to the mother's safety." And we do not hesitate now to advance the same doctrine. In fact, it cannot be forgotten that this operation is nearly always fatal to the female, even admitting that the statistical tables exhibit the exact truth. For instance, laying aside the details contributed by the surgeons of Great Britain, who are charged with the non-performance of the operation at the opportune moment, and supposing that the unsuccessful cases have been as honestly reported as the successful ones, an impartial examination of all the facts leads to the melancholy conclusion, that nearly four-fifths of the mothers have perished; (according to Keyser, the precise ratio of mortality is seventy-nine per cent.) The question then recurs, does this frightful operation save the child? Or is it at all certain that we can present to the mother, as a compensation for all her sufferings, something more than a lifeless corpse? Unfortunately, this is not the case, and the partisans of the Cæsarean section are constrained to acknowledge that they are not always fortunate enough to extract a living child, even when the operation is performed at the most favorable moment. But admitting for an instant that, if resorted to immediately after the membranes are ruptured, the section will always save the child, still this, in my opinion, does not compensate for the dangers to the mother.

You confess that more than one-half of the females die, but can you aver that more than a moiety of the children you save by gastrotomy will live

long enough to dry the tears shed over their birth? Read the tables hitherto published on the average of human life, and then tell me whether fifty, out of a hundred living infants, attain their thirtieth year.[1] Wherefore, it is not only the immediate effect of gastrotomy, but also its remote consequences that are to be taken into consideration. This at least is certain, that you sacrifice more than half of the women immediately; and, even supposing that every child was alive at the time of its birth, the experience of ages has proved, that you will not find one-half of them attain the age at which their mothers died.

The advantage is, therefore, in favor of embryotomy, when considered with regard to the mere question of figures. But the feeble and uncertain life of an infant, who is connected with the external world only through its mother, who as yet has neither thought nor affection, hope nor fear, can it be compared to that of a young woman associated with those around her by a thousand social and religious ties? Or will the survival of this poor child fill up the void left by the death of its mother? And, lastly, can society at large ever hope to receive from a new-born infant the duties it had a right to expect from the adult woman? Hence, family ties and social interests all militate in favor of the mother.

In a political, if not in a moral point of view, we are clearly justified, says Ramsbotham, in preferring the strong to the feeble, the sound man to a diseased one, and, consequently, the mother of a family to the still unborn infant, whenever we are placed under the cruel necessity of sacrificing the one or the other. One more argument yet remains in favor of the view I adopt: the most ancient of all the principles of morality, the foundation of all medical law—is, that we should treat our patients as we would treat ourselves or our dearest relatives; now, where is the physician who, if forced to decide under such circumstances between the life of his wife and that of the child she still bears in her womb, would hesitate to authorize the sacrifice of the latter?

[We may conclude from what has just been said, that embryotomy and not the Cæsarean operation, ought to be performed whenever the pelvis is large enough to allow the cephalotribe to be introduced. Therefore, notwithstanding M. P. Dubois' authority, we think that the latter instrument should be resorted to not merely in pelves contracted to two and one eighth inches, but also in pelves of two inches only. Below two inches, the extraction of the mutilated fœtus is so difficult, long, and painful, that, besides the necessary destruction of the child, the mother is exposed to great danger. At this point therefore, there may be some hesitation as to the choice between the Cæsarean operation and embryotomy. We would add, however, that M. Pajot regards cephalotripsy as preferable to the Cæsarean opera-

[1] From the investigations of Villermé, it appears that in France 20-100 of the inhabitants in the wealthy departments die at one year of age, and 22 100 in the poor ones; 31 100 in the wealthy departments and 33 100 in the poor ones die at four years of age; 38 100 in the former and 42 100 in the latter die at ten years; and, lastly, at twenty years, rather more than 42-100 die in the wealthy departments, and 47 100, that is to say nearly one half, in the poor ones. Yet these figures do not include children abandoned by their parents, of whom, notwithstanding the zeal of public charity, at least 60 out of every 100 die in Paris within the year.

M. Villermé's researches are confirmed by those of M. Benoiston, of Châteauneuf.

tion not only in a pelvis of two inches, but even in one of one and one-eighth inches, (see *Embryotomy.*) Only below the last-named dimensions would this professor decide to perform hysterotomy.]

This rigorous exclusion seems to us warranted by the facts we have witnessed and the record of results of operations performed in large cities, and especially in great hospitals. It is thus shown that the immense majority of patients have perished; we have, however, to repeat, that for some years past quite a number of cases have been published by honorable physicians practising in the country or small towns, and that their aggregate results would make the operation much less serious than when performed in large cities. This fact ought evidently to be taken into consideration, and render less warrantable the preference we accord to embryotomy in the case of women out of the great centres of population. If indeed, it be true, and we think it is so because our confrères affirm it, that in the country three-fourths and even four-fifths of the women who suffered the Cæsarean operation recovered, we have no hesitation in giving it the preference in country practice, whilst maintaining our first conclusion in reference to its performance in large cities.

The almost constant failure of the operation in large cities, such as London and Paris, as compared with the successes obtained in smaller localities, has suggested to some individuals the propriety of erecting a hospital in the country, or at least of sending out of town such patients as it is supposed will require the Cæsarean operation. This precaution is especially insisted upon by M. Guisard, who has just published three new cases of success. The idea could not be carried into execution very easily, yet I think it deserves to be considered, and suggested to the proper authorities. What we have just stated in regard to the difference in the results of operations performed in town and in the country, is calculated to make a strong impression, even upon minds which are strongly opposed to M. Guisard's proposition. All who have had long experience of the diseases of lying-in women, are convinced that most of them originate in the assemblage of a large number of newly-delivered patients in the same place; and this is especially true as regards those whose labors were difficult, and required a bloody operation. To increase the number of lying-in institutions, and to separate the patients as much as possible, I regard as the surest means of obtaining an early convalescence.

It must not, however, be supposed that by sending to some leagues' distance from Paris such deformed women as will require our care at term, they will be placed in as favorable conditions as women who have always lived in the country. The gravity of the operation is certainly influenced by the locality in which it is performed, but so it is also by the health of the patient; now we know that in this respect there is great difference between the women of cities and those who have always resided in the country. To afford them the best chance, therefore, these unfortunate persons ought to be placed in the best hygienic conditions for several months before the end of gestation.

Supposing the necessity for operation has been fully determined, numerous important questions arise for consideration, namely, what is the most favor-

able stage of the labor for its performance? Has the previous duration of the labor any positive influence over the result? And is it better to operate before or after the membranes are ruptured? An answer to all these questions will be found in the careful examination of the published cases.

A. *Duration of Labor.*— The whole duration of the labor has been noted in one hundred and sixty-four cases; in sixty-two of which the woman recovered, and in one hundred and two she was lost. With a view of showing the influence of duration as regards the mother, we divide these cases into three classes, namely:

Where the operation was performed after the labor had lasted twenty-four hours, there were	20	successful and	40	unsuccessful cases.	
From 25 to 72 hours, there were .	34	"	21	"	"
More than 72 " " . .	8	"	21	"	"
	62		102		

From this table, which is taken from Keyser's excellent work, we may conclude that the duration of the labor would appear to have an unfavorable influence only when it has continued beyond seventy-two hours.

But the same remark does not apply to the child; for, taking the same one hundred and sixty-four cases, in a hundred and fifty-eight of which the infant's condition is reported, we find that fifty-seven were still-born, and a hundred and one survived; and, adopting the same division, we have:

After a duration of 24 hours, .	42	succes-ful and	16	unsuccessful cases.	
From 25 to 72 " . .	48	"	24	"	"
More than 72 " . .	11	"	17	"	"
	101		57		

Whence it follows that the chances are less for a living child as the labor is the more prolonged.

B. *Rupture of the Membranes.*— The time that elapsed after the membranes were ruptured has been stated in one hundred and twelve cases. We shall likewise classify these under three heads, according to whether the operation was performed:

		As regards the Mother.	
	Cases.	Successful.	Unsuccessful.
1st. Before or within 6 hours after the membranes were ruptured, ... =	39	20	19
2d. From 7 to 24 hours after the rupture, . . =	35	14	21
3d. More than 24 hours after the rupture, . . =	38	13	25
	112	47	65

From which it appears that the operation is so much the more unfavorable for the mother as a greater time has elapsed after the rupture of the membranes.

The fate of the child is known in only one hundred and six cases; still using the same classification, we have:

	Cases.	Successful.	Still born
1st. Before or within 6 hours after the rupture, . =	37	34	3
2d. From 7 to 24 hours after the rupture, . . =	32	25	7
3d. More than 24 hours after the rupture, =	37	19	18
	106	78	28

c. It is unnecessary to add that, with regard to the fœtus, the prognosis is much more unfavorable when an artificial extraction has been attempted before resorting to the Cæsarean section. Indeed, it must be evident, from the foregoing facts, that the most favorable time for operating is either before or immediately after the rupture of the membranes.

Whenever we have an opportunity of attending the patient during the last few days of her pregnancy, it is advisable to prepare her for the operation by a suitable regimen, such as tepid bathing, moderate blood-letting, &c. But when the labor has actually commenced, the operation is to be proceeded with as soon as the os uteri is sufficiently dilated to permit the subsequent discharge of the lochia. It has been recommended to puncture the membranes, lest the waters be effused into the peritoneal cavity; but as this accident can very easily be prevented, and as the distention of the womb is favorable to the retraction of the organ after the operation, this ought not to be done. Just before commencing, the bladder and rectum are to be emptied. Two bistouries, the one convex, the other having a straight probe-pointed blade, forceps, ligatures, cold and tepid water, a little vinegar, sponges, needles armed with thread, quill-barrels, strips of adhesive plaster, some charpie, and compresses, and a bandage for the body, constitute the necessary apparatus.

The patient is then laid on a bed of the proper height, and is held quiet by the attendants; an intelligent assistant is charged with the duty of keeping the womb on the median line by placing his hands over it; and another presses one hand over the fundus uteri, with a view of keeping up the intestines, which are apt to become insinuated between the uterine and the abdominal walls. The surgeon then makes an incision along the median line, through the skin and subcutaneous fatty tissue, extending from a little below the umbilicus, downwards to within an inch and a half or two inches of the pubis; this incision ought to be at least five or six inches long, and provided this extent is not obtained within the indicated points, in consequence of the woman's low stature, it should be prolonged a little upwards and to the left of the umbilicus. The operator next divides the aponeurotic fibres of the linea alba, layer by layer, and thus gets to the peritoneum, into which he then makes a small opening; having inserted the index finger of the left hand into this, he directs the probe-pointed bistoury along its palmar face and enlarges the incision. The tissue of the uterus is now carefully incised, layer by layer, until the surface of the membranes or the placenta is brought into view; the bag of waters is then opened by a simple puncture, and the probe-pointed bistoury is entered at this orifice, and the incision enlarged to the extent of five or six inches, directing it rather toward the superior than the inferior angle of the external wound. The assistant, who is charged with the duty of keeping the lips of the wound apart, must be very careful to hold the abdominal and uterine walls in contact with each other at the time when the membranes are ruptured. The extraction of the fœtus is afterwards accomplished by seizing hold of the first extremity that presents. The uterus retracts immediately and effects the detachment of the placenta, which is pushed towards the wound; it is then extracted together with the membranes, which have been carefully twisted into a cord.

If any blood has escaped into the uterine cavity, it is removed, as well as any other foreign body that may obstruct the cervix.

It is now generally understood that all operations involving danger from septicæmia should be performed with the most scrupulous attention to all the details of antiseptic surgery. The hands of the operator, assistants, the ligatures, sponges, and instruments should be dipped in carbolic acid solution 15 grains to the pint of tepid water.

The wound in the uterus requires no other attention than that of being well cleansed. The lips of the one made through the abdominal walls are brought together at two or three points by the twisted suture, taking care to leave a free space towards its inferior part for the discharge of the fluids that escape from the abdomen; strips of adhesive plaster are used between the points of the suture, over which the uniting bandage is then applied; some modern surgeons use no sutures, relying wholly upon uniting bandages for keeping the edges of the wound in apposition. Thus M. Lebleu (of Dunkirk) first places beneath the patient, and opposite the last dorsal and lumbar vertebræ, two narrow body bandages with digitated extremities. Upon these, so as to come next to the skin, are laid two strips of adhesive plaster, each four inches wide, but long enough to cross each other in front of the incision. Each strip is cut into three from its extremities for three-fourths of its length. After the operation, the ends of the adhesive strips are applied first to the skin, and then, as they come near the wound, upon two thick graduated compresses placed on each side. They are made to cross each other opposite the incision, leaving only a small open space below. Charpie, compresses, and the two body bandages complete the dressing. This arrangement seems to me well adapted to the case. The wound is next covered with charpie smeared with cerate, and common compresses, and the whole retained *in situ* by a moderately drawn body bandage. The subsequent treatment is restricted to combating the inflammatory and other symptoms as they may arise.

As one of the means best adapted to prevent undue inflammation, Dr. Metz (of Aix-la-Chapelle) insists strongly upon the use of cold. As soon as the patient is placed in bed, compresses saturated in cold water are applied to the abdomen, and followed in a few hours by ice inclosed in bladders. Injections of cold water are also administered, and the patient caused to swallow small fragments of ice.

She is herself conscious, says M. Metz, of a degree of comfort, resulting from the action of the cold, which is a sure guide to indicate the point to which it is best to carry it. The final effect of the cold is the production of discomfort, and should the use of it be continued, an unfavorable reaction might result. Should the cold injections or swallowing of ice bring on diarrhœa, they must be stopped and replaced by enemata of starch and laudanum. If, on the contrary, the injections do not soon produce stools, calomel or castor-oil ought to be administered.

The use of cold has never seemed to interfere with the regular accomplishment of the puerperal functions.

For our own part, we are quite in favor of adopting the plan of M. Metz, inasmuch as we have twice seen newly delivered ladies apply in spite of us,

and without the least inconvenience, cold compresses upon the abdomen and breasts. We are not, therefore, alarmed for the consequences which, *a priori*, we should have feared from the continued action of cold, yet we are unable to think the results obtained by M. Metz as encouraging as he believes them to be. Very probably the future will undeceive him sadly. Still, we have been impressed by the memoir of the Aix-la-Chapelle physician, and we do not hesitate to recommend a method which gave him such results, convinced as we are that no serious objection applies to it.

Laparo-Elytrotomy, Thomas' Operation.—Previous to the paper of Dr. T. Gaillard Thomas, of New York, which was read before a local medical association of that State in 1870, in which he described a successful operation, laparo-elytrotomy had been performed or described at least three times. The advantages of the operation are considered to be so nearly balanced by the difficulties, so many vessels are liable to be wounded and inflammation so liable to follow the extensive separation of the peritoneum, that the method had been entirely abandoned. To Dr. Thomas "belongs the glory of having been the first who performed gastro-elytrotomy so as to extract a living child from a living mother in his first operation, and of having brought both mother and child to complete recovery in his second operation." (Garrigues *N. Y. Med. Jour.*, 1878.) Since Thomas's first case, the operation has been performed three times by Dr. Skene, of Brooklyn, and twice in England, by Himes and Edis.

The operation consists in making an incision a little above, and parallel to, Poupart's ligament, from a point one inch and three-quarters above and outside of the pubes, to a point an inch above the anterior superior spine of the ilium. The peritoneum is pushed up as in the ligation of the external iliac artery, if possible, without wounding it. Through the wound thus made the vagina is opened. The thermo-cautery is used in cutting through the vaginal walls, the surrounding parts being protected by wet compresses. By this method the abdominal wall only is incised, and the peritoneum is left intact. The operation is usually performed on the right side.

Utero-Ovarian Amputation, Porro's Operation.—Porro, of Pavia, in 1876, suggested a modification of the Cæsarean operation, which consists in the removal of the uterus and ovaries after removal of the child, in order to diminish the chances of hemorrhage and septicæmia. The operation, according to the statistics of Dr. R. P. Harris, has been performed 82 times. Of these cases 44 died and 38 recovered; children removed alive, 64. According to the same writer, the operation of removing the uterus and ovaries as supplemental to the Cæsarean section, was first recommended by Blundell, of London. The first actual operation was performed in Boston, July 21st, 1868, by Prof. H. R. Storer.

Porro performed his first successful operation May 21st, 1876, and was followed by Prof Spaeth, of Vienna, with a like result, twelve days later. The operation was performed by Dr. Porro upon a dwarf primipara. The Cæsarean operation was done seven hours after labor began, and a living child removed. The uterus contracted, but not sufficiently to stop the hemorrhage, and the operator at once decided to remove the uterus, using a strong iron wire and serre-nœud, placing the loop around the cervix, opposite the

inner os. When the blood had ceased to escape, he cut away the uterus with curved scissors, passed a long drainage-tube through the Douglas cul-de-sac, tying the ends together, brought the cut cervix to the abdominal wound, and closed the incision with wire sutures.

Müller's Modification.—Porro's operation has been modified by Müller, in order to escape the dangers of hemorrhage and septicæmia. He makes a long incision in the abdomen, draws out the gravid uterus, then constricting the cervix by means of the wire, he evacuates the uterus carefully, cuts through the cervix, and secures the stump as in the Porro operation.

§ 2. Post-mortem Cæsarean Operation.

Whenever a physician is summoned to a pregnant woman soon after her death, he ought to perform it, after having carefully ascertained that the death is real; because the child's decease does not always precede that of the mother, and numerous instances are recorded where living children have been extracted ten or fifteen minutes, and even half an hour, after the woman died.

[M. Villeneuve (of Marseilles), in a paper published in 1862, reports a number of cases in which it was certain that the children had really survived. Thus four of them owed their lives to the performance of the operation immediately after the mothers had expired. Five others were extracted alive after remaining in the uterus from ten minutes to half an hour subsequent to the mother's death. After half an hour, the cases of success became very rare; but there were two after two hours had elapsed, one after two hours and a half, one after three hours, and one after four hours and a half. Although the operation is generally useless at a later moment, it ought nevertheless to be performed; because some cases, whose authenticity I cannot vouch for, would seem to prove that the child's life may remain intact for ten, fifteen, or even twenty-four hours.

As it is the object of the Cæsarean operation to save the child's life, it were useless to undertake it before it becomes viable, that is to say, before the end of the sixth month. The only effect of an operation performed before this time would be the satisfaction of some religious sentiment. It ought to be done as soon as possible, because a few minutes are generally sufficient to terminate the child's life.

Before operating, the physician should, by every possible means, assure himself that the woman is really dead; inasmuch as some cases have shown that this may be only apparent. It is always, therefore, a duty to make the incision of the abdominal and uterine walls with the same care as during life, and to empty the bladder beforehand. An assistant ought also to apply his hands upon the walls of the abdomen in order to press back the intestines and prevent their exit; without this precaution the operation would almost certainly be impeded by the annoyance they would give to the surgeon.]

Forcible Delivery post mortem.—Should the female die during parturition, he ought to examine the condition of the genital organs immediately; for notwithstanding the fact that the labor may have but recently commenced, these parts, from their diminished resistance after death, have occasionally permitted the delivery of the fœtus to be effected by the version or the forceps. In fact, this latter operation would be positively indicated if the child's head were low down in the excavation; because, in such cases, its extraction by the Cæsarean section would be rendered extremely difficult, if not impossible; for numerous recorded instances have fully tested the inefficiency of tractions made on the fœtal trunk through the abdominal incision.

CHAPTER X.

OF EMBRYOTOMY.

This name is applied to the operation by which the parts of the child are divided so as to admit of their successive extraction, when it is impossible to terminate the delivery in any other way. In some cases it consists of simple punctures or incisions made on the head, chest, or abdomen, with a view of diminishing its size, while in others the body of the child is divided into several parts.

It was elsewhere stated that, whenever a considerable quantity of water had accumulated in the head, chest, or belly, the fluid could easily be evacuated by a simple puncture with a straight bistoury, or still better by a trocar; and, therefore, we need not recur to the subject. (See *Hydrocephalus.*)

Embryotomy is indicated whenever there is any insurmountable obstacle to the spontaneous expulsion of the child, and where an application of the forceps proves insufficient to effect the delivery; always supposing that the fœtus is dead, or there are good reasons for believing that its viability is destroyed by the length of the labor. This operation is resorted to in England much oftener than in France; for most of the accoucheurs of that country proscribe the Cæsarean section and symphyseotomy, except in cases of absolute necessity, but they do not hesitate to mutilate the infant, even when it is still living; and the reader will have seen, from the foregoing chapters, that we fully embrace the same opinion.

[Embryotomy is not of recent addition to the obstetric art, for several passages exist in Hippocrates relating to it; but the process is undergoing constant improvement, and gradually assuming the character of a well-defined surgical operation. Embryotomy is performed in several ways, according to circumstances; sometimes being limited to simple perforation of the cranium, to which operation the name *craniotomy* is specially applied; sometimes the head is crushed by means of the cephalotribe, and the process is called *cephalotripsy;* finally, division of the neck, or of some portion of the trunk, may have to be performed. We shall, therefore, give an account, in three successive articles, of: 1st, Craniotomy; 2d, Cephalotripsy; 3d, Embryotomy by section of the neck or of the trunk of the child.

ARTICLE I.

CRANIOTOMY.

Under the name of *craniotomy* have often been classed all operations of embryotomy which are performed upon the head of the child; we prefer, however, to reserve this name for the simple perforation of the cranium, and shall, therefore, use it in this limited sense.

Numerous instruments have been invented for the perforation of the cranium, but we shall describe only those which are best adapted to the purpose, and which are the most generally employed. In the first place, however, we would mention

Fig. 149. Fig. 150.

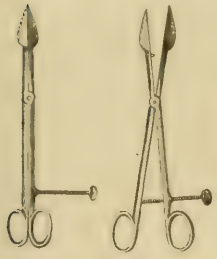
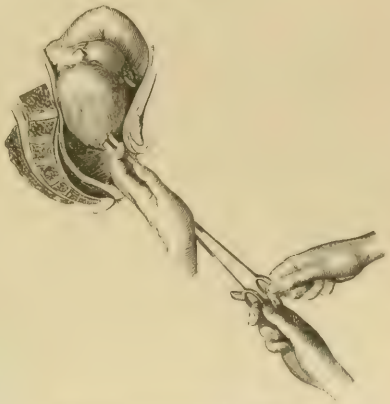


Fig. 149. Smellie's scissors closed.
Fig. 150. The same opened.

Fig. 151.



Mode of introducing and using Smellie's scissors

the simple bistoury, which is in every surgeon's hands, at the same time remarking that it can rarely be used except when the head is very low down and the fontanelles and sutures are easily accessible. Its point would be almost sure to break upon the first attempt to penetrate the bone with it, and it would be very difficult to manage at the superior strait. A common knife may, indeed, be substituted for the bistoury, but it would still be a very imperfect instrument, and every one knows how acrimoniously Sacombe accused Baudelocque of having used it. The sharp point concealed in the end of one of the handles of the forceps[1] would answer the purpose better, and in the absence of a special instrument may even be found very serviceable.

Mauriceau sometimes used a hooked knife, with which he incised the head for the purpose of allowing the cerebral matter to escape, and sometimes an instrument shaped like a pike head, which was the original model of our best modern perforators. Dugès' terebellum is a sort of conical screw, with a deep thread sharpened at the edge, excepting the largest turn, which is left blunt, in order to protect the mother's parts. The inventor claims for it the double office of a perforator and a traction instrument by which the head may be drawn down.]

The instrument generally used is that known as *Smellie's scissors*, which is very strong, and has its cutting edges externally; and, being terminated by a sharp point, is admirably calculated for penetrating through the osseous vault; when, by opening the handles, the original orifice is easily enlarged.

M. Hippolyte Blot has latterly had a perforator constructed by M. Charrière, which, I think, is destined to supersede *Smellie's scissors*, generally made use of hitherto. It possesses all the advantages of the latter without its inconveniences

[1] Some of the French forceps are constructed [illegible]

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This craniotome is composed of two blades, which cover each other, so that when the instrument is closed, the blunt edge of one extends slightly beyond the cutting edge of the other, and reciprocally. (Fig. 152.)

Each free surface bears at its extremity A, a projection, which gives to the point of the instrument a quadrangular form (these projections are borrowed from the perforator of M. Marchand, of Charenton); a screw fixed on the internal surface of the movable branch D, enters a notch in the opposite branch, and limits its motion in one direction, whilst the spring C, limits it in the opposite one.

The two branches are articulated in a manner peculiar to M Charrière (*à tenon*), and they are to be opened when the cranium has been penetrated.

Figs. 152 and 153.

Fig. 152. Cephalotome closed.
Fig. 153. Cephalotome opened.

Fig. 154.

Fig. 154. Cephalotome incising the cranium.

Before withdrawing the craniotome, it is allowed to close itself, after which its extraction from the genital parts is unattended with danger either to the vaginal mucous membrane, or to the fingers of the operator.

The principal advantages of this instrument may be summed up as follows:

1. Great solidity and simplicity.

2. Introduction and withdrawal entirely safe, rendering it capable of being used by the least experienced operators.

3. Capability of acting by *pressure*, and that with a *single hand*, the other remaining at liberty to guide the instrument, keep it in its place, and know what becomes of it during the operation.

4. Power of perforating the bones with the least effort, and, consequently, with the least chance of slipping.

5. It is easily dismounted and cleaned.

6. Finally, simplicity of structure, rendering it a cheaper instrument than Smellie's scissors, provided with their sheath.

[The instrument commonly used in Germany for perforating the head, resembles a trephine whose crown is concealed in a tube which serves as a sheath. Kilian's perforator is a good specimen of this kind of trephine. The instrument is applied to the head of the child and held there firmly, whilst the revolution of the trepan carries it through the scalp and skull, a circular piece of which is removed. The resulting wound has the advantage of being regular, circular, free from spiculæ which might wound the vagina, and so open as to allow the cerebral matter to escape freely. The construction of the instrument is, however, complicated and its application difficult.

We prefer Blot's perforator to all others, and shall have it chiefly in view whilst describing the operation for piercing the cranium. After the woman is put in a convenient position, the operator introduces the fore and middle fingers of the left hand into the vagina, and passes them far through the uterine orifice, until they reach the head of the child, where he holds them as firmly as possible. The right hand then grasps the instrument by its handle, and slips the point along the fingers of the left hand, which serves as a guide, to the head of the child (Fig. 154). It is advised that a suture be sought for, or, preferably, a fontanelle, which would be more easily traversed than a bony plate; but, in most cases, it is not easy to follow the recommendation. On the other hand, the greatest care should be taken to apply the instrument directly to the child's head, and not to perforate the circumference of the mouth of the womb. The scalp offers very little resistance, though it should be borne in mind that it is often quite thick when an œdematous swelling happens to be hit upon. As soon as the point of the perforator comes in contact with the bones of the skull, it is to be rotated on its axis, at the same time making strong pressure through the handle, when, shortly, the sensation of resistance overcome, informs the operator that the instrument has passed through the bone.

Craniotomy is sometimes difficult on account of the mobility of the head, which recedes before the instrument. When this is the case, an assistant ought to make strong pressure with his hands on the hypogastric region, in order to fix the head upon the superior strait. It is important also to be aware that an inadvertent movement may cause the instrument to slip and wound the mother's parts. To avoid this slipping, the perforator ought to be guided as far as possible in the direction of the axis of the superior strait, perpendicularly to the part of the head to be opened, and, preferably, too far forward to too far behind. The handle is to be held firmly by the right hand, whilst the point, carefully supported by the two fingers of the left hand, is prevented from swerving in any direction, and from sliding between the scalp and the bones of the head. It could only be through singular and culpable negligence that the sacro-vertebral angle should be mistaken for the head, and the perforator be implanted upon it. Without anticipating an error of this kind, it would be well to effect the perforation at a point rather near to the pubis, inasmuch as, when the instrument is passed too far back, the point reaches the bones in an oblique direction, and slips more readily.

When the point of the perforator is within the cranium, the entire point of the lance is pushed in boldly; then the movable handle is to be depressed in order to

separate the blades, which are next to be moved in every direction, so as to break up the brain throughout. This act facilitates the issue of the cerebral matter, and by destroying the fœtus instantaneously, spares the accoucheur the harrowing spectacle of a mutilated child still breathing at its birth.

In order to withdraw the instrument, the two blades are allowed to come together, and the lance-shaped head soon re-enters the opening which it made. If it be thought desirable to enlarge this opening, the movable handle is now again to be depressed, when the edge will cut widely through both the bone and the scalp. We ought to say, however, that it is rarely necessary to do this, and that almost always the instrument is withdrawn without enlarging the original puncture. The abstraction of the instrument is immediately followed by a discharge of blood and cerebral matter.

It is more difficult to perforate the cranium when the face presents, but the same rules are to be followed as in the preceding case; being careful, however, not to engage the perforator in the bones of the face, where it might get involved without reaching the cavity of the skull. When possible, the instrument should be passed through the forehead or directed into the orbit, which serves as a sure guide. If the lower part of the face only were accessible, and the mouth open, the palatine arch might be traversed and the cranium entered behind the nasal fossæ, as I once saw done by Professor Dubois. Lastly, in breech presentations, when the trunk is disengaged and the head retained by a contracted pelvis, perforation may be indicated; to accomplish which, it is usual to apply the instrument to the occiput or to one of the parietal bones.

Craniotomy has the advantage over almost all the other operations, of being practicable when the mouth of the womb is not fully dilated, for it may be undertaken when opened just sufficiently to allow the instrument to pass. Under these circumstances it would be impossible to apply the forceps or the cephalotribe. The advantage is here invaluable; for it is well known that, in cases of deformed pelvis, the orifice often dilates very slowly indeed.

As a single operation, craniotomy has much to recommend it. It allows the discharge of cerebral matter; the cranium, being emptied under the uterine contraction, is lessened in size and flattened, so that it sometimes passes the contracted part without requiring any further intervention. To facilitate the accomplishment of this result, after the perforation is made, water may be injected into the cavity of the skull, bringing away in its reflux the greater part of the cerebral substance. Although this injection was very customary formerly, it is now rarely done, because we have at hand powerful mechanical means of crushing the head, should that be deemed necessary.

Craniotomy is an extremely useful operation; of itself, it fulfils all the indications in a certain number of cases, provided we are willing to wait patiently until the head is emptied and moulded to the form of the contracted part. Often, however, it is, alone, insufficient, because the reduction of size of the cephalic extremity affects, for the most part, the vault of the cranium only; leaving its base, which is more thoroughly ossified and thicker, with its normal dimensions. We would also add, that the expulsion of the fœtus can be accomplished only when the contractions are powerful, and then after a long time. Under these circumstances, therefore, it often becomes necessary to extract the head, for which purpose the whole array of crotchets, tractors, and bone forceps have been devised.

Of all these latter instruments, the most dangerous was the crotchet, and its use has been very properly abandoned. It was sometimes fixed upon the external parts of the cranium, and sometimes carried within it through the opening made by the perforator. Its point was then directed to the part upon which it was desired to fix it, getting as near as possible to the base of the skull; the occipital bone, mastoid processes, the sphenoid and petrous portion of the temporal, giving it a suffi-

ciently secure hold. Being satisfied that it was firmly attached, tractions were made in the direction of the pelvic axis; but notwithstanding every precaution, and the skill of the operator, the instrument would often slip and wound severely the maternal organs. It ought now, therefore, to be entirely laid aside.

Tractors and bone forceps are advantageously substituted by the cephalotribe, so that when craniotomy has been performed, cephalotripsy is had recourse to in the majority of cases, provided the mouth of the womb is sufficiently dilated to allow the operation to be performed.

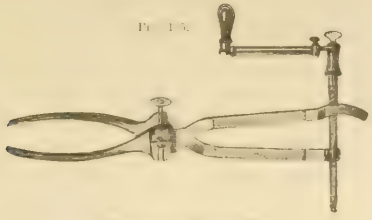
ARTICLE II.

CEPHALOTRIPSY.

Cephalotripsy, also called *cephalothalsia*, is an operation having for its object the crushing of the head of the fœtus, in order to render it possible to extract it. Notwithstanding some scattered passages which show that the idea of crushing the fœtal head had been entertained long since, the operation is of recent date. The conception could indeed hardly have been realized until after the forceps had been invented, because by making the blades of this instrument stronger and closing its handles with power, the head may be reduced in size and even partly crushed; in fact, the forceps of Coutouly, Assalini, Delepech, and Lauverjat acted in this way. Nevertheless the forceps, even when its handles were approximated by means of a screw, could be nothing more than a very imperfect crushing instrument.

It was necessary, therefore, to contrive a special apparatus for the purpose, and this was done by A. Baudelocque, nephew of the celebrated accoucheur of the same name. He gave the first account of his instrument in 1829 and used it shortly afterwards successfully in the case of a woman whose pelvis was contracted to three inches in its antero-posterior diameter.]

Fig. 1.



Baudelocque's Cephalotribe.

Fig. 1a.

Luskа's Cephalotribe.

The honor of the invention of the cephalotribe, notwithstanding several rival claims, is due to M. A. Baudelocque. It is composed of two long

branches, the blades of which are devoid of fenestra, and, besides, are far less curved than those of the ordinary forceps, so that, when closed, they can pass through a diameter not exceeding two inches. The two branches articulate with each other near the middle, and when they are joined, the blades can be tightened at pleasure, by means of a screw passing through the ends of the handles, and worked by a powerful lever.

Even as it is now constructed, Baudelocque's embryotomy forceps is certainly a very useful instrument; but as I have elsewhere proved (*Revue Médicale*, May, 1843), it presents some disadvantages which render its application difficult and often even dangerous. For instance: 1. It is too straight to accommodate itself to the curvature of the pelvis, and it is therefore applied with difficulty to the sides of the head. 2. As the clams are nearly plane, they open like a pair of scissors, and do not incase the head, as the concave blades of the ordinary forceps do; consequently, they are liable to slip, and thus give rise to serious accidents. 3. Tractions made by it are very often ineffectual, even when well applied to the head; because it necessarily draws in a direction different from the axis of the superior strait, owing to the absence of curvatures in the edges of its blades.

As the difficulties and dangers attending its use are not imaginary, I have endeavored to prevent them, by suggesting a modification in the embryotomy forceps generally employed, although well convinced that the failure of an operation is very frequently more dependent on the operator himself than on his instrument. With this view, I had an instrument made by M. Charrière, which differs in two important particulars from those hitherto constructed, and which seems to obviate the various disadvantages I have just enumerated.

We stated above that the absence of curvature in the edges interfered very seriously with the seizure of the head, which is found more anteriorly than in well-formed pelves, both in consequence of the pelvic contraction

FIG. 157.

The embryotomy forceps applied and locked.

and its own elevation; hence, we have given a curvature to our forceps slightly exceeding that of Levret's. This, however, did not require a great effort of the imagination, for we have only impressed the same modification

of the embryotomy forceps that Smellie and Levret long since gave to the one invented by the Chamberlens. This curvature is intended to fulfil the indication of accommodating the shape of the instrument to that of the curved canal it has to traverse.

The slipping of the head during the tractions is principally owing to the fact, as averred above, that the blades, from being nearly plane on their internal surface, do not properly embrace this part, and that, opening like a pair of scissors, their widest separation is found at the points. Here the difficulty was considerably greater, because the internal surface of the clams could not be hollowed out without greatly increasing the interval at their middle part, and, consequently, without rendering the instrument inapplicable to a host of cases where Baudelocque's might be successfully used. After mature reflection, we propose the following as its second and most important modification: namely, to make a much wider entablature at the joint; while, in other respects, the length and width of our forceps correspond with Baudelocque's. This increased width at the articular part permits the base of the blades to be removed from each other laterally by means of a regulating screw, that can be turned at will; the point of which, by working on the pivot, will permit a greater separation at the base than at the points of the blades. Hence, it is evident that when the head is once embraced by the instrument, it cannot slip from the extremity of the clams during the tractions, because the interval is much less here than at the base or even than at their middle part. In a word, the embryotomy forceps hitherto employed resembles a cone when half opened, the base of which is at the points of the blades, and the apex at the articulation; but ours, on the contrary, may, under the same conditions, be compared to a cone having its base at the articular part, and its summit at the extremity of the blades.

[The handle at the end of Baudelocque's cephalotribe was powerful but awkward, besides requiring considerable time for the screwing up and unscrewing; sometimes, also, it struck against the limbs of the patient, so that on all these accounts it became desirable to substitute some better arrangement for it. In M. Chailly's instrument, the handle was replaced by a strap which wound around a metallic axle. Beside this improvement, its edges were sufficiently curved to correspond to the axis of the pelvis. In order to prevent slipping, the ends of the blades were bent in such a way that one overlapped the other, the included part being thus grasped in a manner which makes escape impossible.

Prof. Depaul's cephalotribe has at the ends of the blades two hooks, projecting slightly from the internal surface, which implant themselves in the head when the instrument is closed, and thus render slipping difficult. Instead of the crank for closing the blades, there is a Vaucanson chain stretched transversely from one handle to the other, which is put in motion by a key and pinion. The branches are kept together by means of a ratchet. The manner of working it is very simple: the instrument being applied, the chain is passed through the opening in the end of each handle; then the key is applied and turned until the blades are sufficiently approximated, after which the extraction is proceeded with. To detach the instrument, it is only necessary to raise the ratchet, when the chain instantly becomes free, and is removed very quickly.

M. H. Blot invented an instrument whose branches are brought together by means of a removable screw which may be attached at will on the end of the left

handle, and then pushed through a bifurcation of the right handle. The handles are then approximated by a nut which traverses the screw.

In Locarelli's cephalotribe the handles are brought together by a screw which passes freely through an opening at the end of the right handle, and then enters a nut made in halves and hinged, placed at the end of the left handle. When it is wished to disconnect the instrument, the hinged nut is opened and the screw is immediately free. This instrument allows the two branches to be brought together and separated more rapidly than any other. The right branch of Locarelli's cephalotribe is, besides, very slightly curved, to allow of its application behind the pubis, the other branch being applied behind. The head of the child is thus compressed from before backward in the direction of the antero-posterior diameter, which is almost always contracted.

The cephalotribes most used in Germany are those of Hüter, Scanzoni, and Braun, whose chief peculiarity consists in the effecting of the compression by means of an endless screw between the branches of the instrument and parallel to it. The handles are embraced by a metallic ring, as may be seen on certain pincers used by mechanics, and the screw, by moving the ring up or down, separates or closes the handles as desired.

It is not our intention to treat here of every case to which cephalotripsy is applicable, whether the necessity for it depends upon the mother or upon the child; but we shall undertake to examine the consequences of the application of the cephalotribe upon the head of the fœtus. As a compressing and crushing instrument, the cephalotribe possesses considerable power; and there can be no doubt that the head is broken up by it with great ease, regardless of the direction in which it is seized; but whilst it is flattened in the direction of one of its diameters, the others are sensibly lengthened, which is a fact worthy of attention. The experiments of Hersent, who wrote a very interesting paper on this subject, show that all the diameters except the one included between the blades of the forceps are lengthened, on an average, about seven sixteenths of an inch, when the cephalotribe is applied, without the previous performance of craniotomy. In a second set of experiments the cephalotribe was used after opening the cranium, when the same increase of all the other diameters than the one seized was again observed; but in the latter case, the increase, instead of being seven sixteenths of an inch, did not average more than from one sixteenth to three sixteenths of an inch. These experiments will not be lost sight of when we come to consider whether it will be worth while or not first to perform craniotomy when the use of the cephalotribe is decided upon.

The crushing of the vault of the cranium only would not be sufficient in many cases of extremely contracted pelvis, and amongst the various objections made to cephalotripsy it has been questioned whether the base of the skull was ever really broken up by that operation. It is evident that the effects will vary according to the manner in which the head is seized, but we are able to assert that the base of the skull is often really broken up. There can be no doubt that this was the case with two heads upon which we ourselves performed the operation, and which are now in the obstetrical museum founded by Prof. Depaul at the hospital of the Clinique. We would add, that on more than one occasion we crushed not only the base of the skull, but even several of the first cervical vertebræ.

The compression and crushing of the head, although considerable, still have limits which it is well to be acquainted with before undertaking the operation. It is well known that deformities of the pelvis, in consequence of the absolute impediment which they present to the expulsion of the fœtus, afford the most positive as well as the most frequent indication for the performance of cephalotripsy; but it ought to be equally well known that beyond a certain point the contraction of the pelvis itself makes the operation difficult, or may even render it impossible. The foregoing considerations are the more opportune as the advantages and innocency

of the cephalotribe forceps have been generally overrated in the acceptance of the inventor's claim that it might always be efficiently and easily applied, provided the sacro-pubic diameter would measure more than one inch and eleven-sixteenths of an inch in length. Hersent, on the other hand, as the result of his experiments on the dead body, fixed the extreme limit at two and a half inches, and when the contraction was greater than this, did not believe that cephalotripsy could be performed successfully unless the child was very imperfectly developed. Experience has proved this idea to be erroneous, and most accoucheurs unite in the belief that unless the child be very large, success may be looked for in a pelvis which measures no more than two inches in its antero posterior diameter. Still it should be well understood that a contraction so great as this renders the manipulation of the instrument very troublesome, whilst the operation is long and difficult and the risk to the patient very great. Ought it therefore to be decided that under two inches cephalotripsy is so serious an undertaking that the Cæsarean operation should be preferred to it? Prof. Pajot protested against this opinion, and, undeterred by the difficulties, declares in a paper published in the *Archives Générales de Médecine*, that he considers cephalotripsy as proper not only in a pelvis of two inches, but even in one of one inch and one-eighth of an inch, and admits of no limit save that which renders impossible the introduction of the instrument.

But we ought to add that a favorable result under these circumstances would be impossible were it expected to extract the head between the blades of the forceps; M. Pajot, therefore, after crushing the skull, unlocks the instrument and withdraws the branches separately without making any traction, leaving it to the uterus to mould the head upon the contracted part and effect its expulsion.

M. Jacquemier had already examined this side of the question when he wrote as follows: "The agency of the cephalotribe forceps is rather one of compression than of extraction. In many cases, it is capable of crushing the head when it will be incapable of dragging it through the contraction. Still, under the latter circumstances it may prove of great service, and either attain or powerfully concur to the attainment of the end proposed. For when the instrument is withdrawn, the head is really supple, plastic, entirely reducible in every direction, which is a condition completely at variance with that which it has when still retained within the jaws of the closed instrument, a fact to which sufficient attention has not been paid. If left to the expulsive efforts of the womb, it may still be able to pass the obstacle after becoming moulded to the form of the pelvis; extended where the latter is larger, and flattened where it affords the least space."

The cephalotribe may be applied at once upon the head without previous perforation. The head is then crushed, and the cerebral matter is forced from the cavity of the cranium under the scalp, when the latter remains intact, or escapes altogether when it happens to tear. At other times the brain finds exit through the orbits, the nostrils, or the mouth. Baudelocque thought this kind of evacuation was all that was necessary, and even regarded the preservation of the integrity of the scalp as one of the advantages of his method. What we have said of Hersent's experiments shows that the reduction of the size of the head is greater when the cranium is perforated before the crushing; therefore craniotomy is now almost always performed before using the cephalotribe; and as it is certainly the preferable course, we do not hesitate to advise it. It is true that it has been charged with favoring the formation and projection of splinters of bone, whose points are liable to lacerate the maternal tissues; but are not these splinters as liable to be formed when the head is crushed without previous perforation? We have already witnessed a great number of cephalotripsies, and observed how very rarely this inconvenience occurred. The matter has made an undue impression, and the argument drawn from the production of spiculæ seems to us far more availing in theory than in practice. The fact is, that the wound made by the perforator [illegible]

always included between the blades of the instrument, which shield the vagina, whose walls they keep apart; so that if projecting points of bone were detected, nothing would be more easy than to remove them, either with the hand or strong pincers, before making any attempt at extraction.

Therefore, except under peculiar circumstances, the cranium should be perforated, after which cephalotripsy should be performed under the same conditions and with the same preparations as required by an application of the common forceps at the superior strait. The rules which should guide the surgeon in the introduction of the cephalotribe are precisely those prescribed for the forceps; therefore, the instrument should be warmed, greased, and each branch held and introduced like a branch of the forceps, in order to be placed on the sides of the superior strait without regard to the direction in which the head will be seized. In this application, however, difficulties must be expected to be met with, due to the faulty conformation of the pelvis; the blades are liable to be turned aside and are sometimes twisted around so as to bring the concave surface outside. Very often, long continued trials are required before they can be placed regularly in position. No force ought ever to be used, for, as the instrument is heavy and its end quite narrow, though rounded, the uterus might easily be torn by any sudden movement. The first branch is generally pretty easily applied; there is more trouble in finding a passage for the second, and it is sometimes necessary to withdraw the first branch, and invert the order of introduction. When the head is firmly pressed down upon the superior strait, a free space should be sought for through which to slip the end of the instrument. Generally, however, the head is movable and recedes before the blades, which fail to grasp it unless care be taken to hold the head motionless by an assistant, who does so by making strong pressure with his hands on the hypogastric region. At other times, the permanent contraction of the uterus upon the head occasions another kind of difficulty. To overcome them all, the best plan is to introduce as far as possible the hand which serves to guide the blade, and then, in order to avoid unnecessary suffering to the woman, the second blade can be slid along the same hand. This was Hatin's plan and is recommended by Chailly; we think it a good one in some cases, although we would not make it an ordinary rule.

The very first thing to be done is to grasp the head firmly and to crush its base if possible; but to effect this the instrument must be made to enter very deeply, lest a portion only of the head be seized and the crushing be imperfect. Almost all authors recommend, besides, that the handles of the cephalotribe be pressed very far back against the perineum, in order that the blades shall have a forward direction, because, as is well known, in deformed pelves the sacro-vertebral angle projects and presses the head toward and against the pubis. This counsel ought not, in my opinion, to be too strongly urged, for I think I have observed that when too closely followed, the vault only of the cranium has been crushed. I explain this failure by supposing that in most strongly marked cases of contracted pelvis the fœtus is often doubled up in such a way that the cranial vault corresponds with the anterior abdominal wall, whilst the base and neck look backward toward the sacro-vertebral angle. Therefore, in practising cephalotripsy, after having passed the blades in very deeply, I have no objection to their remaining near the promontory; in so doing I have often succeeded in crushing the base of the skull and first cervical vertebræ at the very first attempt. Still, it were not reasonable to lay down positive rules in regard to this point, because the fœtus is not always similarly situated in reference to the circumference of the pelvis.

The cephalotribe is locked in the same way as the forceps, and the same difficulties in doing it are liable to be met with. The crushing is next proceeded with by turning the handle, chain, strap, or screw, by which the arms of the instrument are brought together. This stage of the operation ought to be executed slowly and gradually, in order to force out the cerebral matter, without lacerating the scalp,

and causing the projection of spiculæ of bone through the points of rupture. The operator knows that the head has been well seized and emptied of its contents as far as possible, by observing the free discharge of brain externally. The degree of approximation of the handles also indicates the amount of flattening of the skull, and he often hears, or what is still more significant, feels, the crepitation which declares the crushing of the bones. Difficulty is liable to occur from the mobility of the head, which evades the instrument by rising above it or escaping before or behind the blades. The head, unfortunately, slips easily from the grasp of the instrument on account of the narrowness of its blades and their being so slightly curved upon the flat; on this account, M. Chailly recommends that after perforation the excerebration be performed by a forceps which fits better the rounded form of the head than the cephalotribe; the latter instrument being only used upon an already flattened head. The plan, however, is objectionable on account of the greater number of manipulations required.

When the head is grasped at last, the cephalotribe is to be closed as far as possible before proceeding to extraction; slipping is indicated by the great facility with which the handles can be brought together or the instrument withdrawn; in which case there is nothing to be done but to make a new attempt after changing the direction of the blades.

When the head is crushed, which will be known by the degree of closure of the handles, which ought to be almost in contact, the state of the parts ought to be carefully ascertained, and if any spiculæ project remove them. A few tractions will next show whether the head is securely held, and if so, the delivery will be proceeded with by drawing gently. Here it must be remembered, that although the head is flattened between the two blades, its other diameters are lengthened; and as the cephalotribe is almost always applied to the two extremities of the transverse diameter, the elongation takes place from before backward, that is, from the pubis to the sacro-vertebral angle, making it almost impossible to bring the head down into the pelvis without changing its position. To do this, the instrument is gently turned round far enough to bring the lengthened diameter of the head into correspondence with the oblique diameter of the pelvis; but it would be better still to turn it further until it has gone one-fourth around upon its axis, since in this position the flattened part of the head corresponds with the sacro-pubic diameter, which is almost always short, and the lengthened diameter to the transverse one of the pelvis, which is generally wide enough to allow it to pass without difficulty.

In the majority of cases, moderate tractions only are required to bring the head into the excavation. It ought then to be again turned, so as to bring its long diameter in an antero-posterior direction, and the two blades are drawn out in correspondence with the two ischio-pubic rami. Should difficulty be encountered, a few trials will soon indicate the best direction to be given them.

If the head is very firmly grasped, its size lessens during the tractions, and it moulds itself, so to speak, upon the shape of the contracted part; but, unfortunately, the instrument is not always well applied, or the stricture is considerable, so that in spite of the utmost care the cephalotribe loses its hold and slips upon the head. The tractions ought then to cease at once; otherwise there would be danger of tearing the scalp, and the instrument should be unlocked and withdrawn. Under these circumstances the expulsion of the child might, it is true, be left to the efforts of nature, but we think it preferable to proceed at once to a second or even third application in order to crush the head completely. Therefore, the instrument ought to be reintroduced with all the precautions which we have given. Still greater care, indeed, should be used; the hand must be introduced very deeply in order to guide the blades, whose ends often come in contact with the inequalities of the head or foldings of the scalp produced by the first operation. It should be

attempted, also, to seize the head in a new position in order to crush it, so to speak, in every direction. The unfortunate tendency of the instrument to get into the groove which it made the first time, is one of the greatest difficulties to be contended with. These successive crushings followed by tractions, constitute the usual method of performing cephalotripsy as we have almost always seen it done by Prof. Dubois, and is the one preferred by M. Chailly and described by him in his book.

It does not appear to us that moderate tractions, even though they may be kept up, are likely to be injurious; contusion of the parts being no more liable to occur than when the head is impelled by powerful contractions of the uterus. Spiculæ are not often formed, and if they should be, care will be taken to remove them. The plan of successive applications and tractions is, we think, a good one, and that which we prefer.

But what is to be done when several applications of the instrument have failed to remove the head? We think that it would be imprudent to repeat the attempts more than three or four times, and if unsuccessful, the woman should be allowed to rest for several hours. The operation, in fact, ought to be resumed as often as required, without being continued too long at a time. Whilst the patient is resting, the uterus contracts, the head adapts itself to the opening of the pelvis, and a subsequent attempt is often more successful than it would have been a few hours previously. This mode of proceeding was characteristic of M. Dubois' practice, and was, so to speak, the secret of his great success. Herein cephalotripsy is comparable to lithotrity, successive operations being less dangerous than long-continued efforts.

Cephalotripsy, as just described, has become an every-day practice. M. Pajot asserts that it is a good one, and of undoubted service in cases of moderate contraction; but, says he, in extreme cases, such as range from two and five-eighths inches to an inch and one-eighth, the operation is unanimously conceded to be extremely dangerous; so much so that it may be said, with considerable justice, to be quite as hazardous to the mother as the Cæsarean operation, and that without the compensation offered by the latter, of the possible and sometimes probable preservation of the life of the child. Below two and five-eighths inches, M. Pajot thinks it dangerous to make traction, and would have the operation repeated without it. As in cases of extreme contraction it is impossible to deliver the fœtus without mutilating it, perforation will be performed as soon as possible, in order to favor the dilatation of the orifice, and the cephalotribe will be applied as soon as the dilatation is sufficient to allow it to be introduced. M. Pajot describes his method of performing the operation as follows:—

"The first crushing having been executed with the necessary care, and the head being firmly held, I attempt, with great caution, to rotate the instrument so as to make the reduced dimensions of the head correspond with the contracted diameters of the pelvis. I try then very gently to turn it either to the right or left, as may be most easy, and if considerably resisted on either side, I abstain from any further effort. Formerly, I was more persevering, but experience has taught me that the womb almost universally succeeds, and often very shortly, in moulding the new form given to the head by crushing, to the shape of the canal, at the same time imparting to it the movement of rotation performed with such difficulty by the instrument, the effect of the contraction of the womb upon the entire bulk of the fœtus being to turn it more certainly and with less danger than the cephalotribe would do. When the head is crushed as much as it can be, I unscrew the instrument, unlock it, withdraw it gently, *without having exercised the least traction*, and immediately proceed to a second, and, if the case requires it, a third crushing *without any traction*. The woman is then put to bed, and a light broth prescribed for her. According to the state of the patient's pulse, the general appearance, her quiet or excitement, as also the weakness or strength of the contractions of the

womb, I would repeat the crushing operation every *two*, *three*, or *four hours*, allowing two or three introductions of the instrument for each time. When called early, I have not yet had occasion to exceed four of the stages, whilst *one* or *two* have sometimes been sufficient. The head having been thus repeatedly crushed, the body generally presents difficulties which one or two crushings usually suffice to overcome. Such is the method which I have termed '*Repeated Cephalotripsy without Traction.*'"

Whatever plan be pursued, when the head has cleared the vulva, slight tractions are usually sufficient to effect the delivery of the trunk: the latter, however, sometimes resists, and the crushed head affords a very insecure hold, so that it is often found useful to tie a fillet around the neck, and endeavor to bring down the arms, as much for the purpose of lessening the size of the shoulders as with the object of using them for purposes of traction. When all these manipulations have failed, the cephalotribe is again inserted, in order to crush the chest, and it rarely happens that one or two applications do not effect the desired result.

The difficulty caused by the trunk, therefore, is rarely so great that it cannot be overcome; but in spite of all that can be done, it is sometimes impossible to extract the head; and then the women either die undelivered, or are delivered by a resort to turning. These last facts are certainly worthy of meditation, and have recently been commented on by my friend, Dr. Bertin, in his inaugural thesis, of which I have some knowledge. Dr. Bertin thinks that moderate tractions only ought to be made with the cephalotribe, and should the head not come down, he proposes to go after the feet and effect delivery by pelvic version. Under these circumstances, the latter operation has undoubted advantages, which are recapitulated as follows in the thesis which I have mentioned: "When the head is once crushed, as it is possible to do by one or two applications, provided the blades of the instrument are properly placed, and especially passed high enough, all those dangers will be avoided which result from the too frequent introduction of an iron instrument into organs which are congested and often in a state bordering on inflammation. There is no cause for apprehending those disorders which are liable to be caused by the contusion of soft parts pressed between the subjacent bony canal, and the debris of the skull, notwithstanding the integuments which cover them. To extract the child, it is necessary to get a firm hold of the lower limbs, which may enable us to guide it more readily through the contracted pelvis, and bring its longer diameters into correspondence with the longer diameters of the maternal passage. Very powerful tractions also may be made without risk, inasmuch as the mother's parts are compressed only by the soft parts of the fœtus. The head, being no longer clasped by the blades of the instrument, is at liberty, through the imbrication of the bony fragments, to mould itself freely upon the canal to be traversed, and should the arms be raised, they will be situated alongside of a head which has been flattened and converted into a soft and movable pouch."

I agree with Dr. Bertin, that pelvic version, resorted to after cephalotripsy, is destined to be of very great service; but, unfortunately, it can only be indicated in exceptional cases. Thus, it would be impracticable to perform it through a pelvis contracted to less than two inches (see *Version*), and even when the pelvis will allow the hand to pass readily, it is liable to be arrested by spasmodic contraction of the womb.

Chiara states that his experience in the Milan clinic, so prolific of cases of dystocia from pelvic stenosis, has convinced him that version, in stenosis under 2½ inches, is, as a rule, a very bad procedure, as it only succeeds in a few cases.

Cephalotripsy he regards as a better proceeding in stenosis to the degree. The cephalotribe which he uses in these cases is the small compressing forceps of Cazeaux. The same rules for the application of the forceps or the common cephalotribe are applicable to Guyon's instrument. It is simply important that the head be held firmly

This cephalotribe, made as a pair of forceps, has greater traction power than the common cephalotribe, but still leaves the head compressed in the pelvis, especially if compression has been thoroughly and regularly made. In this case the remedy is to make extension by fixing the crochet or blunt hook in the face.

Cases of retained head after detachment of the body will be treated of in the following article (see page 1058), and we have nothing special to add in this place to what is there said on the subject.

Numerous objections have been raised to the operation of cephalotripsy; thus, independently of the difficulties which attend it, and which we have pointed out, it is said that the length of time which it often demands, and the frequent manipulations, exhaust the women and render them liable to very severe inflammations, besides inflicting sometimes fatal traumatic lesions. It may be added, that some of the patients have recovered with vesico-vaginal fistulas. Can any better reply be made to these charges than that nobody denies the gravity of the operation, and to ask what better can be done? Such as it is, cephalotripsy is often and undeniably successful; Hemming, one of its latest detractors, himself publishes statistics which prove better than any argument, the services which it is capable of rendering, viz.: that out of 200 cases, there were 161 recoveries and 39 deaths.

Dr. William Jones gives, in his excellent thesis, the following results collected by him in the hospital of the Clinique at Paris, during the years 1857, 1858, and 1859.

In contractions of the pelvis above 3¾ inches, out of three cases of cephalotripsy, one was fatal.

From 3¾ inches to 3¼ inches, out of seven operations one fatal case.

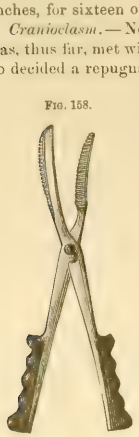
From 3¼ inches to 2⅝ inches, six cases, all recovered.

Below 2⅝ inches, eight cases, only three saved, and five deaths.

We thus have a total of 24 operations, giving 7 fatal cases and 17 recoveries. It is impossible to overlook the gravity of cephalotripsy in contractions below 2⅝ inches, inasmuch as for eight operations there were five deaths; whilst above 2⅝ inches, for sixteen operations, there were fourteen successful.

Cranioclasm.—Notwithstanding the advantages of cephalotripsy, the operation has, thus far, met with little favor in England, without any apparent good reason for so decided a repugnance in a country where craniotomy is so generally recognized. Besides the real objections already mentioned, the cephalotribe has been condemned on account of its considerable size, and its introduction into the genital parts made a subject of ridicule. This, however, being a poor argument, we hope that the prejudice will soon disappear; in fact, we think that we find an evidence of concession in the instrument devised and described by Simpson, under the name of the *Cranioclast.* (Fig. 158.)

Fig. 158.



The cranioclast, although much smaller than the cephalotribe, is, like it, intended to crush the bones of the head. It has two branches, which cross each other at the point of articulation; but the blades, instead of being curved, are almost straight; one of them, which we shall term the male blade, is solid and very thick, whilst the other, or female blade, is provided with an elongated fenestra which receives the male blade when the instrument is closed. A firm grasp is insured by the form of the wooden handles attached to it.

Although a more complete instrument, the cranioclast resembles such bone forceps as those of Mesnard, Stein, Boer, and Davis. It is used as follows. Craniotomy having been performed, the female blade is passed between the head and the pelvis, and the male blade pushed into the cranium through the perforation which was previously

made. After locking the instrument, enough force is applied to the handles to crush the part seized, and to disjoint the bones by a twisting motion. Repeated applications to different parts of the circumference of the cranium are almost always requisite. To effect extraction, direct traction is sometimes all that is required, whilst at others it is necessary to turn the cranioclast several times upon its axis in order to roll the walls of the head, made soft and flexible by crushing, around the blades.

Simpson claims for his instrument the following advantages: The cranial bones to which the blades are applied are made soft and flexible, so that the contractions of the womb are often sufficient to expel the head. No bony fragment capable of wounding the genital parts projects beyond the scalp, which remains uninjured and completely protects the mother's organs. The size of the head is so far lessened as to become less difficult to extract than the trunk and shoulders. The crushing of the bones of the head always leaves sufficient hold for the instrument to prevent its slipping during extraction.

Unfortunately, experiments upon the dead body, and operations attempted upon the living by others than Simpson, have not proved so satisfactory. In the first place, it is not easy to apply the instrument, because of the absence of a curvature corresponding to the axis of the pelvis, and it is so short that the locking has to be effected in the vagina if the head is rather high up; now, under these circumstances, it is far from easy to effect the locking. The crushing is, besides, very imperfectly performed; although the bones are broken, they are rarely disconnected from their fellows, and still form with them a resisting structure; spiculæ of bone have also been known to perforate and project through the scalp. We shall extend our criticism no farther, having said enough to show that the cephalotribe has the advantage as a crushing instrument, leaving the cranioclast far behind in the comparison. We ought, however, to state that the latter instrument has really appeared to us to take a very firm hold of the bones of the head, a quality not to be despised when it is required to deliver a recently crushed head. In a certain operation rendered difficult by an extremely contracted pelvis, after having crushed the head in every direction, we were brought to a stand by the difficulty of extracting it, the cephalotribe having several times lost its hold. C. Braun's modification of Simpson's cranioclast has placed it beyond this criticism of Tarnier. Being larger and stronger, with more curve to the blade, and better adapted for making compression, the large cranioclast is destined to replace the cephalotribe in many places. Prof. Chiara

The Saw Forceps.—After making trial of the cephalotribe, Van Huevel found fault with it because it lengthened all the diameters except the one situated between the blades. He therefore concluded that it would be very difficult for the head to engage if it were above the superior strait, and if locked in the pelvis, the elongation of the diameters could hardly fail to bruise the soft parts of the lesser pelvis. He denied the possibility of being always able to rotate the instrument so as to bring the lengthened diameter to correspond with the normal diameter of the pelvis, observing, also, that the head can never be crushed from before backward; that is to say, in the direction of the usually contracted diameter. We have already disposed of these objections, which, nevertheless, induced M. Van Huevel to invent his saw forceps, which may be compared with the cephalotribe, although differing from it in its mode of action. With this new instrument he divides the head between the blades of a forceps, so as to enable him to withdraw the pieces separately without violence. The least traction detaches them, and they neither bruise nor wound the genital parts.

The saw forceps is composed: 1. Of an ordinary forceps, each blade of which bears internally two tubes flattened in opposite directions, and soldered together, the side of one against the surface of the other, so that their transverse section represents an overturned —. They are bent from without inward like the forceps itself, but are set in a straight line from below upward. The [illegible]

the tubes, placed lengthwise of the blades, incloses a strip of steel which conducts the saw; the *external*, which is directed across the instrument, lodges the prolongation of the chain. They communicate by a large slit, which divides the internal and external walls of the former throughout its length, and the internal side only of the latter. The forceps articulates by entablature, with a movable pivot; upon the base of the latter turns a support perforated with a hole, in which is inserted a grooved key.

2. Of a clock chain, toothed as a saw in the middle of its length for the space of eight and a half inches, and provided with transverse handles, one of which can be unhooked. This chain passes through the upper opening of two steel strips, which are flexible above, and thicker and toothed below, and which, by entering the internal tubes, conduct the saw between the blades of the forceps.

3. Of a long key, with grooves and collar, like that of Heurteloup's instrument for crushing calculi, entering into the hole of the support upon the base of the articular pivot, and fitting into the teeth of the conducting strips. The extremity of the handle is split, and serves to turn the pivot of the forceps, as also for drawing out separately, with one of the two points, the strips from their sheaths.

Setting aside technical details, Van Huevel's instrument may be described as a forceps, each branch of which has on its inner face a gutter running from one end to the other, and of two strips of steel, both having an eye at one end through which a chain-saw passes (just like a thread with a needle at each end). After the forceps are applied, the two slips to which the chain-saw is attached are pushed into their respective grooves. The saw is thus brought into contact with the head, and embraces it to a greater or less extent, according to the distance to which the steel slips are pushed in. Motion is given to these slips by means of a grooved key, which fits into the teeth with which the slips are provided.

The mode of operating is described by Van Huevel as follows. The instrument should only be applied when the woman cannot be delivered either naturally, or with the assistance of the vectis, forceps, or by turning; the neck of the womb should also be dilated, and the membranes ruptured. Before operating, a bed should be prepared with a straw mattress, and a mattress folded double; bolsters, pillows, napkins, and bedclothes, make up this part of the provision. The woman lies upon her back, with the hips brought down to the edge of the mattress; the legs and thighs are flexed, and held apart by two aids, one on either side. The forceps are warmed slightly, and greased externally.

Suppose the head presents, no matter in what position. The operator takes his place before the woman, and inserts first on the left side of the pelvis, the male branch, introducing it as far as possible into the uterus, and one of the assistants holds it, whilst the other is passed in on the right side. When the forceps is articulated, a few tractions are made, in order to be certain that the head is well seized. The surgeon gives the handles of the instrument to the assistant on his right, whilst he surrounds it with a ligature. Then immersing the ends of the conducting blades, armed with the saw, in oil, he introduces both of them into their respective sheaths until they touch the head of the fœtus. He next passes the key beneath the left thigh of the patient, and engages the grooved end in the opening of the support; the assistant takes its handle in his right hand, and turns the key slowly on its axis, whilst the operator puts the saw in motion. Care should be taken to prevent the chain from twisting, and, as far as possible, to make the tractions in the direction of the guiding tubes. Unless the key is turned very slowly, the saw will be arrested by pressing too strongly upon the bones of the head. Should this occur, the assistant must reverse the motion of the key slightly, and afterward continue the manœuvre until the operation is completed.

When the section is finished, the key is taken out, and the handle of the chain unhooked, that it may be withdrawn; the conducting blades are also removed, and, finally, the branches of the instrument itself, after their disarticulation.

At this stage of the operation, if the woman is not exhausted, and expulsive pains make their appearance, the rest is left to nature, being careful to ascertain the disposition of the segments by the touch. A part of the brain escapes, the sawn edges override each other, the two portions of the cranium, especially the posterior one, become flattened, in consequence of their being traversed by flexible sutures, and the fœtus is eventually expelled. When, on the contrary, the woman's strength is exhausted, the detached portion of the head is seized with the abortion forceps or a pair of pincers, and therewith extracted. Should it happen that, in consequence of the blades of the forceps not having been introduced far enough into the pelvis, the division was not thoroughly effected, the adhesions should be broken up by means of twisting and other motions communicated by the pincers; as soon as the segment is detached, both it and the remaining parts will pass without difficulty.

However, should any trouble be experienced in extracting the fragments, there is no reason why another section, different from the first, should not be made, by giving another direction to the forceps. The already divided cranium can be depressed without difficulty, and therefore cannot prevent the diagonal application of the branches. This second operation leaves the skull divided into four unequal portions capable of being compressed in any direction, and extracted without difficulty.

It is not, however, always necessary to unlock the instrument in order to withdraw it, for after the head is sawn through, it is sometimes only necessary to make a few tractions with the instrument to cause a completely detached segment of the head to be delivered; occasionally, also, the entire head is withdrawn. If the resistance be greater, the instrument must be unlocked as mentioned.

The saw-forceps, though very often used in Belgium, has been rarely tried in France, and even then has failed in skilful hands. Dr. Verrier, however, defends it in his inaugural thesis, in which, after mentioning twenty-nine of Van Huevel's cases, twenty-three of which were successful, he reports fifteen cases derived from Drs. Simon, Marinus, and Wasseige. Eleven of the fifteen were entirely successful, two died in consequence of lesions existing previous to the entrance of the patients into the hospital, and two from peritonitis occasioned by the long duration of the labor. It is plain that these facts prove the saw-forceps to be a good instrument and comparable with the cephalotribe, though they do not prove it to be superior. To extend the comparison between the two instruments, it may be added, that the saw-forceps, like the cephalotribe, requires a certain field for action; its blades in their widest part measure one inch and five-eighths, and those operators who have used it most frequently do not venture to advise it in contractions below an inch and three-quarters.

A great objection to the saw-forceps is its great cost, its complexity and the minutiæ which have to be attended to during the operation. The movement of the chain-saw is not accomplished very easily, and it is liable to be jammed or broken. Another serious objection is, that it requires an experienced assistant: as the motion of the conducting blades should accord perfectly with that of the crank, it is necessary that both operators should act in unison. Finally, the greatest defect of all in the saw-forceps is its inefficiency as an extracting instrument and the frequent necessity for using bone forceps, in spite of all the objections to their employment. Nevertheless, there is cause for regret that the practical use of the instrument is not better known in France, as want of experience prevents our estimating its advantages or disadvantages at their just value. (Extracted from the *Traité d'Accouchement* of Lenoir, Sée, and Tarnier.)]

ARTICLE III.

SECTION OF THE NECK AND BODY.

We shall not describe decapitation performed after the body has been delivered, because, when it becomes necessary to perform it voluntarily, the process is as simple as possible, whether a scalpel or scissors be used for the purpose.

But this is not the only case in which the separated head is left behind in the uterus, for it will presently appear that a similar course is adopted in certain trunk presentations; or, the same thing may happen from ignorance or stupidity. In all cases the head has to be delivered, and its extraction is exceedingly painful when the pelvis is much deformed; for it then presents by its base, thereby rendering perforation more difficult. Under such circumstances, it has been recommended to attempt to turn the head, so as to bring some portion of the cranial vault to the superior strait, which of course should be done whenever possible. The excessive mobility of the head singularly favors the slipping of the perforator, and exposes the mother's parts to laceration. The best way of preventing this accident, is to direct an assistant to place both hands over the hypogastric region, and fix the head there by making considerable pressure at that point.

But the difficulty is not brought to an end by the perforation of the cranium, for even then the embryotomy forceps will often become necessary if the contraction is excessive; and, owing to the mobility of the part, its application is very imperfect, and it is likely to slip at the first tractive effort. The trouble in getting hold of the head is not merely dependent on its mobility, because, when the inclination of the superior strait is very great, it is situated above the pubis, and therefore cannot be reached by the instrument, which is necessarily directed posteriorly, in consequence of its moderate curvature.

It was to this that I attributed the failure of the attempts made on one occasion by M. Paul Dubois, at the Maternité. The Professor, being worn out by several hours of fruitless manipulations, had the kindness to permit my assistance. I introduced the right hand, and got hold of the lower jaw, which I attempted to draw down, but without any better success, as the base of the cranium was arrested by the symphysis. I found that the failure of my tractions was owing to the fact of their being directed too far downwards and forwards. I then substituted a blunt hook for the finger, and fixed it on the lower jaw, when, by depressing the handle of the instrument posteriorly, so as to make it operate downwards and backwards, I was soon fortunate enough to get the head into the excavation, from which it was readily delivered afterwards.

Most of the difficulties met with in this case might certainly have been prevented, by using the instrument just described, invented by myself.

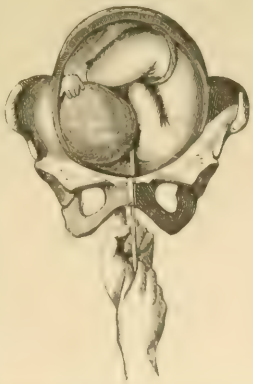
Division of the neck or body is generally performed within the genital passages, the operation being sometimes the only means by which the operator can prepare the way for delivery in body presentations.

Version, in fact, is not always practicable in trunk presentations; for instance, where the membranes have been ruptured, and the waters dis-

charged for some time, and the shoulder is low down in the excavation, the forcible contraction of the uterus may render introduction of the hand and version of the fœtus absolutely impossible. In such a case, we have nothing to do but to wait for spontaneous evolution, if the child is living; but as soon as it is dead, we must promptly relieve the mother from the dangerous consequences of a prolonged labor.

To amputate the arm under such circumstances is altogether useless, because its presence cannot incommode the operator; and, besides, it may afterwards prove very serviceable by favoring the tractions; it is on the body we have to act, and of the various plans suggested for the purpose, those described by Celsus and Dr. Lee are the only ones that appear practicable. In cases of this kind, Celsus had recourse to decapitation; and I have known this plan to be employed by M. Dubois on several different occasions. He acts in the following manner: Having ascertained the exact situation of the child's neck, he introduces the whole hand into the uterus (the left one when the head is at the right side, and the right one when it is at the left), and, hooking the index finger over the cervical region, he endeavors to draw it downwards, so as to make this part more accessible; should the finger not prove sufficient, the blunt hook is advantageously substituted for the same purpose (see Fig. 159). A pair of long scissors, having thick and very sharp blades, and moderately curved on the side, so as to correspond with the axis of the pelvis, is then guided up to the infant's neck along the palmar surface of the hand previously introduced; then the blades are opened a little, and a small portion of the neck is cut, then a second, and thus, by repeated small incisions, its whole extent is gradually divided. When the decapitation is completed, he draws on the arm which is usually found in the vagina, in this way extracting the trunk without much difficulty; and afterwards he delivers the head in the manner above stated.

Fig. 159.



Mode of using the blunt hook in the trunk presentation, in order to bring down the neck.

The decapitation is not always feasible, at least we could not succeed in effecting the section in a case to which we were called by Dr. Leveillé. The head and neck were so high, and the uterus so strongly contracted, that it was not possible to get the hand and scissors far enough up to embrace the neck properly; after several fruitless attempts, we determined to perform the operation recommended by Doctor Lee, but, before doing so, concluded to try the pelvic version. The right hand was passed in as far as the breech, but it could not reach the feet; the forefinger, curved like a hook, grasped the buttocks, and whilst this hand was pulling on the breech, the side of the fœtus, which had already engaged in the

excavation, was pushed upwards and to the right by the fingers of the other hand. By operating in this manner for five or six minutes we were fortunate enough to bring down the pelvic extremity, and thus terminate the labor favorably as regards the mother. The lying-in presented nothing unusual.

[Decapitation only, is capable of fulfilling all the indications when, in a case of presentation of the body, it is impossible to turn. It has been objected to on account of the difficulty of performing it, and various instruments have been devised with the view of making it easier. A small knife shaped like a pruning-hook, fixed in a long and strong handle, may be used; or else a special instrument recommended by M. A. Baudelocque. Ramsbotham, Sen., also invented a sort of blunt hook with a concealed blade in its concavity, which, after the instrument is applied to the neck, becomes detached and severs it like a guillotine.

Van der Ecken proposed cutting through the neck with a chain-saw. For my own part, I had made by Charrière a blunt hook, in imitation of Belloc's sound. After the hook is applied, the spring passes through it behind the neck and comes out at the vulva. A cord is then attached to it which will include the neck when the hook and spring are withdrawn. My idea was to use the thread for the purpose of drawing through the chain of a linear écraseur, by which to effect the division of the neck. The only difficulty would be found in the passing of the spring around the neck, but I am so well satisfied that it would often be impracticable, that I believe the plan could be adopted in a few special cases only. Prof. Pajot devised a blunt hook containing a groove and tipped with a leaden ball, to which is attached a piece of whipcord lying in the groove. The hook being introduced, the cord is loosened and the leaden ball is supposed to drag it by its weight into the vagina, after having passed behind the child. To effect the division, M. Pajot proposes using the cord as a saw by grasping the ends and drawing alternately upon one end and the other with a rapid motion. The thread is passed through a wooden speculum in order to protect the vagina. It must be confessed that it is a rather curious way of effecting an operation of the kind, yet the possibility of doing it cannot be denied, inasmuch as it has been repeatedly accomplished by M. Pajot on the dead body in the presence of his pupils. The difficulty, however, does not lie here, but in the passage of the ball, which, I think, would be found no easier than in the case of the spring just now spoken of.

Of all the instruments contrived for the purpose, that of M. Jacquemier is, in my opinion, the best adapted to the object in view, and the most readily applied. It consists of a blunt hook with a wooden handle. The hook is included for its whole extent in a sheath. Hook and handle are constructed with a groove, in which slide a series of connected blades which are put in motion by raising and depressing alternately the little handle to which they are attached through the medium of a rod running the entire length of the hook. M. Jacquemier operates as follows: The hook inserted with its sheath being passed around the neck, he introduces the blades into the grooves and pushes them on by means of the handle until they project from the concavity of the hook. A to-and-fro motion then being communicated by the little handle, soon divides the soft parts down to the spinal column. The operator now withdraws the blades and substitutes for them a saw of the same size. With it, the bones are cut through without trouble, and it is withdrawn in order to complete the section of the soft parts with the cutting blades, which are again placed in the instrument for the purpose. Both the instrument and its manipulation are, as is seen, somewhat complicated, but it performs well on the dead body, and doubtless would be serviceable in practice.

Dr. Lee's method consists in separating the arm from the body, as also in perforating the thorax and abdomen; then, by fixing the blunt hook on the pelvis or lower part of the spine, he makes use of sufficient force to bring the child down double, and thus effects its delivery by a mechanism very similar to the spontaneous evolution. Perhaps it would be better to follow Davis's plan, and divide the trunk in two, and afterwards extract the parts separately.[1] This method should never be resorted to except when the section of the neck is impossible.

In a case in which version could not be effected, M. Parmat resorted to a process somewhat resembling that of Dr. Lee's, except that he did not first amputate the arm, this very properly seeming to him an altogether useless preliminary. Making use of the blunt hook which terminates the handle of the forceps, he passed it beyond the false ribs, and then turning it forcibly, so as to bring its extremity in contact with the integuments of the fœtus, he perforated with it the walls of the abdomen, if unable to reach the ribs, so that in withdrawing it, it hooked into the lower border of the thoracic parietes.

Then, by means of tractions with the branch of the forceps, he succeeded in communicating to the trunk a motion similar to that which it performs in spontaneous evolution. The head and shoulder ascended gradually, whilst the pelvis approached the vulva and was finally delivered.

This quite simple method is certainly preferable to Dr. Lee's, and in many cases might be substituted for the decapitation of the fœtus.

[1] M. Payan, of Aix, resorted to Davis's operation in one instance, where the trunk was low down in the excavation: but the plan certainly did not originate with him.

APPENDIX

TO

CAZEAUX & TARNIER'S

SYSTEM OF OBSTETRICS.

BY

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EMBODYING THE LATEST DISCOVERIES AND METHODS OF TREATMENT IN OBSTETRIC MEDICINE.

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PREFACE TO APPENDIX.

At the request of the Publishers I have prepared this appendix to Cazeaux and Tarnier's Theory and Practice of Obstetrics. It is designed to include a number of subjects which have been omitted or but lightly touched upon in the work itself, or which appear especially interesting and useful to the profession at this time.

In doing this, while it has been my object to bring each topic as near as possible down to date, I have not intended to treat of each exhaustively, but rather to present them in a practical manner, taking pains to discuss each question more particularly from the point of view of most interest to the general practitioner.

While the general tenor of recent professional opinion has been followed in the several articles, the expressed views of the most eminent obstetricians have received full attention and are largely quoted, proper credit being given by foot-notes wherever the references appear.

I trust that this addition to Cazeaux and Tarnier will add to its value and usefulness, and will commend it to the profession as a most exhaustive and systematic treatise on obstetrics.

The chapters on Hygiene and Dietetics, on Anæsthetics and Narcotics, on Antisepsis, and on Obstetric and Gynecic Jurisprudence, have been prepared under my supervision, by my assistant, Dr. Brooks Hughes Wells, to whom I am also indebted for much valuable aid in the collection of material, proof-reading and correspondence.

20 West 15th St., New York.
April, 1888.

PAUL F. MUNDE.

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I.

THE HYGIENE AND THERAPEUTICS OF PREGNANCY, LABOR, AND THE PUERPERAL STATE.

THE object of this paper being only to discuss those parts of the subject which are omitted or only lightly touched upon in the body of the work, the therapeutics of the so-called "diseases of pregnancy" will not be treated of, except to give to the reader some hygienic or therapeutic measures which my experience has led me to consider reliable.

Though a strict line of distinction cannot be drawn between them, we will endeavor, first, to consider the general dietetic and hygienic measures most useful and necessary, from the time of conception to the completion of post-puerperal involution, and then will speak of the therapeutic measures and agents of most importance in the treatment of certain pathological conditions which may arise during this period.

HYGIENE: *of Pregnancy.*

In the gravid state, from the moment of conception to the time of birth, the normal, or rather the physiological, so frequently approaches or even stealthily oversteps the boundary separating it from actual disease that the conservation of its proper hygiene, and the intelligent treatment of the pathological conditions which may arise call for a degree of diagnostic acumen, and a measure of quickness, accuracy and self-reliance on the part of the physician which is not always or easily attained.

Your patient should be made to understand and feel that both her own welfare and that of her unborn child may greatly depend on the proper use by her of certain hygienic and dietetic measures.

Cleanliness may be said to be the first of these, and cleanliness in its very widest sense; the *primæ viæ*, the kidneys, the lungs, the skin, should each be given every facility possible that can aid in the task of removing the waste and effete matter from the system. The almost ever present tendency to constipation should be combated and counteracted, if possible, by the regulation of the habits and diet. This latter should be plain and nutritious, and should consist partly of fruits and coarse bread made from unbolted flour. This not being sufficient we should use mild laxatives, preferably some of the natural or artificial saline waters, the compound liquorice powder or other simple aperient. The physician should not place too great reliance on the statements or opinion of the patient in regard to the condition of the bowels, as deception may be intentional, or, as some women consider that a stool once a week is all sufficient, may proceed from ignorance, but should judge for himself by the careful noting of the subjective symptoms; the coated tongue, the foul breath, the dull and discolored con-

junctiva, the frontal headache, the capricious appetite, the disordered digestion, all uniting in telling a story no one can mistake.

The kidneys, the most important emunctory organs, taxed at this time to their utmost by the altered vascular tension and changed quality of the maternal blood, as well as by the large amount of excrementitious material which it contains, should not have their burden increased by the neglect to keep the other eliminative organs of the body honestly at work. Gluttony should be avoided as much as its opposite. The body should not be exposed to cold or wet, for this, by causing a renal congestion, is especially apt at this time to be the feather which turns the scale toward disease, always serious and often persistent. The urine should be tested for the presence of albumin every second week during the latter months, that the consequences of its presence do not confront us unawares.

Cleanliness of the skin by frequent tepid spongings or baths enables its glands to work freely, and thus to relieve the kidneys from a part of the strain imposed upon them.

Plenty of fresh air and sunlight, by enabling the oxidation processes to go on more rapidly and perfectly, are of the first importance; the patient's rooms should be as perfectly ventilated, both by day and by night, and as free from any source of impure emanations, as is possible; she should not visit a crowded lecture hall, or theatre, or church, or any place where the air is impure, not only from the presence of an abnormally large percentage of carbon dioxide, but also from the nameless exhalations from the breath and skin, which we recognize as *closeness* on coming from a pure air into a crowded room.

Exercise, avoiding that which is violent or excessive, should be insisted upon, the usual household duties should not be relinquished, and the woman should be required, in addition, to be in the open air a certain part of each day. In the latter months, should a diffidence, born of her condition, keep her from going out in the daytime, send her with her husband, for a walk, in the evening. That moderate exercise exerts a beneficent influence on the course and termination of pregnancy, is plainly seen in the Maternities, where a part of the "waiting women" remain idle in the wards, while the remainder are employed as help, and have light work of various kinds to perform, the latter almost invariably remaining in a much more healthy condition during their pregnancy, and enjoying a shorter and more easy labor, their children also seeming to possess more vitality.

Excitement of all kinds and anxiety should be prevented, as far as is possible; sexual intercourse should be prohibited, as having, by increasing the congestion of the genital tract, a possible tendency to produce abortion, especially at what would have been the periods of the menstrual flow; sufficient sleep should be procured; the clothing should be warm and comfortable and loose-fitting, and should be enlarged as the breasts and abdomen increase in size, so that there be no constriction or pressure of these parts. Where the abdomen is pendulous or flabby, the patient may wear an abdominal

supporter with advantage. During the first few months of pregnancy the uterus should be examined, especially where retroversion or prolapsus has existed before, to see that the uterine axis is normal, and in the latter months, to make sure that the presentation is not faulty.

Toward the latter part of pregnancy the nipples should be examined, with reference to the cure of possible fissures or tenderness, or the remedying of a depressed condition, much trouble and suffering being often saved by a few simple precautions taken at this time. If the nipples be flat or depressed, their condition may often be much improved by lifting them up by the fingers, or by inverting the bowl of a clay pipe over them and drawing them out gently, daily, by suction, the dress being worn so that no pressure comes over them. If there be even a suspicion of tenderness or fissure, some astringent lotion, as brandy and water, or Goulard's extract, should be applied every other day for a month before the expected confinement.

Of Labor.—When labor begins, the fears of the patient, especially if a primipara, should be allayed; she should, in general, be told that everything is all right, though any expected complication should be stated to the friends; no definite prognosis as to the result or time of termination of the labor should be given, a delphic ambiguity in our answers to these questions being most desirable. The patient should have any light food she may desire; the bowels should be thoroughly cleared out by an enema of oil, or an ounce or so of glycerite of ox-gall and warm soapsuds; the latter combination being a most efficient measure. The bladder should be regularly emptied at short intervals; the hair, if long, should be braided, and a loose wrapper put on, so that the patient may be in readiness for the incidents attending the advent of the second stage. We have supposed that before this the accoucheur has informed himself, by abdominal palpation (see Article III), of the position and presentation of the fetus, and by digital examination, per vaginam, of the condition of the maternal soft parts and the probable absence of any deformity or obstruction in the pelvic walls. Other necessary attentions to the mother and child during and after labor, have been exhaustively treated of in the body of the work (page 388 *et seq.*), to which we refer the reader.

Placental Expression.—I must take exception to the method advocated, of delivering the placenta by forcible traction on the cord (page 381 *et seq.*), an antiquated procedure, which is now only employed by ignorant midwives or by irresponsible persons falsely claiming to be physicians.

The method which I employ in my practice, and which I have used for years with the best results, is as follows: When the child is born, a drachm of fluid extract of ergot is given, and gentle friction made by the hand on the fundus until the cord ceases to pulsate, when the cord is doubly ligated and cut, and the child given to the nurse; the hand is then (its place having been supplied by that of the nurse during this short interval) replaced over the uterus, and gentle friction continued until the uterus contracts uniformly;

as soon as this occurs, the uterine sphere is grasped by the whole left hand, or, if necessary, by both hands, and gently compressed toward the axis of the brim; if the placenta is not then felt to escape, as shown in the immediate decrease in the size of the uterus, the friction is recommenced, and expression again tried, until the afterbirth is expelled. Unless it voluntarily emerges between the labia, I have found it much less painful to the patient and fatiguing to the physician, to draw *gently* on the cord as soon as the palpating and expressing hand shows that the placenta has escaped from the cavity of the uterus, and thus guide it over the perineum, where it is received by the right hand and gently withdrawn with a twisting motion, so as to make a cord of the membranes, rather than attempt to force it out of the vagina by supra-pubic pressure.

As soon as the placenta has been removed, gentle, steady friction is kept up over the fundus, with occasional expression of coagula, until permanent contraction ensues, which may occupy half an hour, or, in doubtful cases, a longer period. Then, if necessary, a compress is laid over the fundus and a binder applied, this latter article being used more as a comfort and support to the woman than because it is absolutely necessary for her subsequent recovery.

In some cases prolonged gentle friction of the uterus is indispensable to secure the detachment of the placenta, before which detachment even the most forcible expressive power will be in vain. It can be readily ascertained by the palpating hand—and often the eye can see—whether or not the placenta is detached, one or the other uterine horn projecting above its fellow—evidently, the remainder of the uterus contracting, while the placental site remains passive. As soon as the latter also contracts, the uterus will assume a smooth, spherical contour, and then expression will prove effective. This friction, with occasional trials of expression, may last fifteen minutes or more, though I have seldom found it to exceed the quarter-hour.

In case the gentle traction upon the cord should fail to extract the placenta from the vagina, one or two fingers may be passed into the rectum, and the placenta thus dislodged.

The advantages of placental expression, as above described, are obvious, and may be briefly enumerated as follows: The avoidance of the introduction of the hand into the vagina and uterus and of forcible traction on the cord, and, therefore, of possible septic infection, tearing out of the cord and sudden inversion; further, the prevention of hemorrhage and the speedy expulsion of the placenta by propulsion—the natural mechanism.

Disadvantages there are none, except those mentioned below, and injuries to the uterus from careful, steady, not too violent, expression have not been known to occur. It may be well to sound one note of warning, and that is, not to make unequal pressure on the uterus, particularly on the relaxed placental site, which, if the remainder of the organ chance to be flabby, might possibly produce partial or complete inversion.

The same obstacles to the expression of the fœtus—hyperæsthesia, inflam-

matory affections or obesity of the abdominal walls—will naturally, also, interfere with placental expression to a greater or less extent. The chief obstacle to expression of the placenta is its pathological adherence, which, since the adoption of expression, has become very much less frequent than formerly. Another obstacle, not uncommonly taken for actual adherence, is a spasmodic contraction at the internal os or at either horn of the uterus—the placenta lying loose above the constriction—which cannot be overcome by expression, it being generally necessary to dilate the constriction and remove the placenta manually. Positive adhesions must be severed by the hand in utero; expression will not succeed. The expression of the placenta, in a case of greatly premature delivery, may occasionally fail, either because the organ is very small and lax or the child is dead.

A precaution which should never be omitted is, to inspect the placenta immediately after its delivery, particularly the maternal surface. Should any cotyledons be found missing, search should be made for the absent portions by introducing the hand into the uterus, where they will be found, either adherent or loose.

Immediately after the removal of the placenta, the uterus will be felt by the palpating hand as a firm, hard ball, of the size of a child's head, some three or four inches above the pubes. Frequently one circumscribed portion or other of the fundus, corresponding to the prominence previously felt, will now be found depressed and soft, showing a slightly inverted site of the placenta. This, which Fritsch calls a "normal physiological paralysis of the placental site," soon disappears with the uniform contraction of the uterus induced by gentle friction, which should be continued for from a quarter to half an hour after delivery, until the danger from hemorrhage is past. Not uncommonly relaxation of the uterus takes place several hours after labor, and oozing of blood occurs into the uterine cavity, distending it frequently to double its normal size. I have repeatedly expressed clots of the size of a fist from the uterus three or four hours after labor. But this was at a time when I was not in the habit of giving ergot simultaneously with the birth of the head, as I now do. The advisability, therefore, of palpating the abdomen of every puerpera, at intervals within twelve hours after delivery, is apparent. I always instruct the nurse to watch the size and tension of the uterus, and show her how high the fundus should normally stand; in the absence of a nurse, the patient herself may be taught to feel and watch over her uterus.

Of the Puerperal State.[1]—For the first few hours after labor, the woman should have only fluid nourishment, such as milk or broth; but after this time she may have almost anything she desires in the way of food, except articles of known difficult digestion, her diet being made as nutritious as possible—chicken, beef, eggs and milk being its staple articles. At the same time, care should be taken not to disorder the digestion by over feeding.

[1] See [page 421 *et seq.*]

The bowels may be left alone until the third day, when, if they have not moved, a cathartic should be given; after this, they should be kept regular. It is not necessary to give the time-worn, nauseous dose of castor oil; other remedies more pleasant are equally efficient. Constipation often produces a rise of temperature and a feeling of general wretchedness, which may easily be mistaken for an indication of more serious trouble until a cathartic removes the symptoms, clearing the intestinal canal and the diagnosis at the same time.

The urine should not be drawn except where, after trial, the woman is found unable to pass it herself, this trial being repeated each time before the instrument is used, or where a perineal laceration has been closed, in which latter case the catheter may be passed for a couple of days. The bladder should be frequently evacuated during the first twelve hours after labor, as its even moderate distention at this time markedly increases the tendency to uterine relaxation and consequent oozing of blood or accumulation of clots in its cavity.

I object to the routine use of the catheter after labor, advocated by many authorities, for two reasons: first, that it is often unnecessary, and second, on account of the danger of causing cystitis, of which I have seen some instances, by carrying irritating or infectious material into the bladder.

You may say that this can be avoided by perfect cleanliness, and so it can be, but it is difficult, and often impossible, to impress on the mind of the nurse or attendant what this cleanliness is, or the necessity for its accomplishment, and the physician himself can hardly be present every time the patient wishes the urine drawn, and see that the genitals are carefully washed and proper precautions observed in the passage of the catheter, this being done by inspection, in order to avoid introduction of lochia into the bladder, and not by touch, as formerly taught.

A binder, applied with moderate firmness, and reaching from about the tenth rib to below the trochanters, is a source of much comfort to the patient, and is of benefit by supporting the relaxed abdominal walls, and by maintaining a certain increased amount of intra-abdominal pressure assisting the contraction of the heavy uterus. The binder usually should not be worn more than eight or nine days.

After-pains are best prevented by keeping the uterus well contracted by the use of ergot, and most surely relieved by morphia and camphor, or stupes of chloroform liniment. Ergot also is valuable in hastening involution (see below).

The proper management of the breasts at the onset of lactation is of the greatest importance. I do not believe in the common occurrence of the so-called "milk-fever," which many regard as a natural or essential condition when the secretion of milk begins, for where antisepsis (V) in its details is successfully carried out, and the breasts are not allowed to become over-distended and painful, the temperature during the whole lying-in period should

not go above 99°. The question which now demands our attention is, what is the proper management of the breasts?

About one year ago Dr. Phil. A. Harris, of Paterson, N. J., in a paper on "The Treatment of Mastitis by Bandaging and Rest,"[1] directed the attention of the profession in general to the advantage of systematic pressure in the treatment of threatened or existing mammary abscess or inflammation, and conclusively showed the good results which could be obtained by this treatment.

At this time the same principle of support and pressure was undergoing evolution at the New York Maternity Hospital, where for many years support had been given to pendulous breasts by a strip of muslin pinned around the chest. From this was gradually developed the treatment now used there, which is as follows: After labor, if the patient's mammæ are at all heavy or pendulous, a *breast binder* is applied, by which the breasts are lifted upward and toward the middle line, only slight tension of the binder being required for this purpose. When the secretion of milk begins, if the breasts become very full and tender, the pressure is increased, and, if added heat and tenderness tell of probable beginning inflammatory trouble, the binder is applied as tightly as it can be drawn, and is not removed except when it becomes soiled, until all is right. Should the nipples become so sore that it is not considered proper to allow the child to nurse, they are touched with the silver stick, dusted with tannic acid and the binder is put on tightly and left in place until the nipples are healed. If only one nipple is sore, it is found most convenient to bind up both breasts, leaving a small hole or flap which can be pinned up after nursing, opposite the sound nipple. When the child is still-born, or it is wished to prevent or diminish the secretion of milk for any cause, the binder is at once applied *tightly*, a piece of lint soaked in a solution of atropia sulphate in glycerine (gr. ss to ʒj) having first been placed over the breast, and allowed to remain as long as may be necessary. The atropia solution may sometimes cause slight dryness of the fauces and dilatation of the pupil, but is a very neat, elegant and efficient preparation. *No rubbing or manipulation* of the breast is allowed under *any* circumstances, the milk when in excess flowing away spontaneously under the pressure of the bandage.

This compression of the mammæ, under the circumstances just mentioned, invariably relieves the symptoms, so that an inflamed or suppurating breast is rarely seen where this method of treatment is properly carried out.

The binder, as now used, was devised by Miss Marion Murphy, the supervising nurse of the Maternity. A strip of cheap, unbleached muslin (cheap, loosely woven cloth fits the figure better than that which is firmer), a yard long and eighteen inches wide, is folded once, so as to form a square, and a piece cut from the folded edge, as in Fig. 160, *a*, beginning about five inches from the top and extending two inches into the cloth; this edge is then

[1] *N. Y. Med. Jour.*, Vol. xxvi, 1877, p. 1.

folded over in the same direction again about seven inches, and a second piece cut from the new fold (Fig. 160, *b*) as at first, but beginning nine inches from the top and extending a trifle over two inches into the cloth, so that when unfolded it would be represented by Fig. 161. When this bandage is applied the breasts are at first lifted upward and inward, toward the median line, a little cotton or oakum being placed between them, and, in some cases, around them, if the bandage is to be applied tightly, none being required if it is merely put on for support; the edges of the cloth are then turned in

Fig. 160.

Fig. 161.

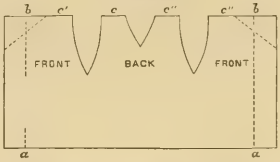
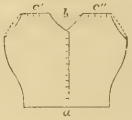


Fig. 162.



and pinned in the median line (Fig. 162 *a b*), always from below upward, the parts over the shoulders (Fig. 162, *c' c''*) being pinned last. A little practice is required to enable one to apply this binder effectively and neatly. Its advantages are, that while just as efficient as the roller-bandage, even when the latter is most skillfully applied, it can be put on more easily and quickly, the patient is not disturbed, not having to sit up, it never becomes displaced, is neater and more comfortable.

Therapeutics.

Ergot.—In regard to the dangers following the use of this drug as an oxytocic in conditions of uterine inertia occurring before the birth of the child, Barnes, in his recent admirable work, expresses my opinion most graphically when he says: "Before whipping up the uterus to increased exertion, we must be satisfied that there is no obstacle in front so great that reasonable increase in driving force will not overcome without injury. We must be sure that there is no marked rigidity along the parturient tract, no distortion or contraction of the pelvis, no disproportion or malposition of the fœtus, or other obstructive complication. This postulate is not always easy to obtain; and error or miscalculation may entail serious, even fatal consequences. This is one objection to ergot. There are many others. The case, once entrusted to ergot, is likely to be beyond our control. We have evoked a brutal power like that given to Frankenstein. Ergotism, like strychnism, will run its course. If it acts too long or too violently, you cannot help it. You may try epichontocics, but these may fail. The ergotic contraction of the uterus, when characteristically developed, resembles tetanus. Then woe to the mother if any obstacle should delay the passage of the child, and woe to the child if it be not quickly born. The ergotic contraction does not observe the physiological character of alternating diastole, systole and

repose, conditions necessary to the orderly circulation of the blood through the uterus, placenta, and fœtus."

Barnes, also, considers it an imperative rule not to give ergot during the placental stage, saying that it is likely to prevent the very object in view, by exciting irregular or tetanoid contractions, which lock up the placenta and render attempts at its extraction abortive and dangerous. Here, however, I cannot agree with him, as my routine practice is always to give ergot immediately after the birth of the child—the placenta being expressed as described above, and in an extensive experience I have yet to note any ill result from its use in this manner, though much that is good; not so much in the prevention of immediate hemorrhage as in the insuring of permanent and thorough contraction of the uterus.

I am in the habit, in cases where I fear subinvolution, of giving a pill containing one grain each of ext. ergot and quinine and one-fourth grain of ext. nuc. vom. three to four times daily during the first two weeks, or even longer, if the presence of bloody oozing shows that involution is not taking place properly.

Iron and strychnia may often be advantageously combined with ergot where the patient is weak and anæmic. The danger which some mention, of causing super-involution, I have never seen, and I do not think that it will ever occur if attention is given to the degree of involution reached, and the ergot stopped when the uterus is reduced to nearly its normal size.

In post-partum hemorrhage, where the stimulus to contraction is wanted at once, ergot should always be administered hypodermically, as we cannot afford to wait fifteen to twenty minutes for its effect when given by mouth. A good plan is to inject five or ten grains of Squibb's solid extract, dissolved in twenty minims of water, when the hemorrhage is threatened. This acts promptly and certainly. Pain at the point of injection is apt to be complained of subsequently, which is easily relieved, if necessary, by fomentations of lot. plumb. et opii, but seldom anything more serious—abscess rarely being developed if the injection was made deep into the subcutaneous cellular tissue, or even into the muscles.

Chloral.—In the therapeutics of the first stage of labor a most useful agent, one which will relieve false—though stimulating true—pains, which will quiet nervous or hysterical irritability, will procure refreshing sleep, obtund the sensibility to pain, assist the dilatation of the os when the cervix refuses to yield to the force of normal pains, and will accomplish these ends with no harm and with but insignificant danger to the patient, is *chloral*, properly administered. Also in the second stage—when we require that which, while it produces a partial anæsthesia, does not lessen the force of the uterine contractions, and does not cause in the third stage, or after, any increased liability to uterine inertia and hemorrhage—chloral is efficient and safe. In the vomiting of early pregnancy we have found it efficient in the drop doses noted above, and in the medical treatment of eclampsia it is, when combined with other agents, a most valuable accessory.

Altogether, we see that we can, by its use, fulfill a wide measure of the therapeutic indications of pregnancy and labor.

While chloral can be administered to such an extent as to produce surgical anæsthesia—so that even amputations and the Cæsarean section have been done with the patient under its influence—such procedures are dangerous, and may lead even to fatal results—death being caused by the direct paralysant action of the drug upon the heart, its movements ceasing in diastole. While in obstetric practice no death has occurred that can be directly attributed to the action of chloral, still, as fatal cases of poisoning have been reported from its use in other conditions, it is well to be acquainted with the symptoms which result from an overdose and the best means of combating them. Death has resulted in an adult from a dose of twenty grains, and, on the other hand, a patient has recovered after taking an ounce. These, however, are the extremes. "From other cases, it appears tolerably plain that most people would recover, especially with appropriate treatment, from a single dose under 8 grms. (gr. 120), but anything above that quantity taken at one time would be very dangerous, and doses of 10 grms. (150 grs.), and above, almost always fatal. If, however, 8 grms. were taken in divided doses during the twenty-four hours, it could be done with safety."[1]

With safe doses, the hypnotic state is not so intense that sleep cannot be easily warded off; in dangerous doses, the narcosis is uncontrollable, the appearance of the subject being strikingly like that observed in alcoholic intoxication.

Personally, I have only, out of a large number of cases, seen one where the symptoms were at all alarming. The patient had taken sixty grains and appeared decidedly drunk, not being able to walk and being almost completely anæsthetic. She was given five grains of caffeine citrate and, the heart's action being good, was allowed to sleep. In three hours the effects had entirely passed away. Should we be so unfortunate as to produce poisonous effects, we should at once employ emetics, and, these failing, the stomach tube. Strong, hot coffee should be given by the stomach or in an enema; the body should be kept warm; the patient should be roused by shouting, shaking, striking with a wet towel, etc., and, in more serious cases, small hypodermics of strychnine sulphate or nitrate should be given and repeated, and artificial respiration practiced, if necessary. Amyl nitrite has been recommended, and small doses of any of the nitrates might be given hypodermically.

In the many cases where I have used this drug, I have almost invariably succeeded in attaining the end I wished, and have seldom found it necessary to give more than forty-five or sixty grains. I have seen cases where fifteen grains was all that was needed, and once have given one hundred and five grains before the patient became quiet. In some instances, where the patient is of an excitable disposition, a noisy, semi-delirious state is caused by moderate doses; this condition is relieved by increasing the dose.

[1] Blyth: "Poisons, their Effects and Detection." Wm. Wood & Co., N. Y., 1885, p. 138.

I have many times introduced my hand into the uterus to remove membranes or fragments of placenta after the patient had taken forty-five grains in divided doses, and the act has scarcely been noticed by the woman. The agony of the expulsive pains is so very much lessened by the drug, used as described below, that it is seldom necessary to give an additional anæsthetic, except for serious operations, or where we wish to have complete relaxation of the uterine muscle. In this case, ether would be preferable to chloroform, because of its stimulating effect on the heart. In a minority of cases, chloral seems to diminish somewhat the force of the uterine contractions; in more, it has no appreciable effect on them; while in most instances it seems to make them stronger, and certainly increases their efficacy.

I consider the best mode of its exhibition to be by mouth, giving a fifteen or twenty-grain dose once, for the removal of pseudo-pains; fifteen grains, repeated every hour, or long as may be necessary to lessen nervous irritability and to relieve the nagging pains of the first stage; the same dose, at half-hour or twenty-minute intervals, in conjunction with repeated hot douching, to lessen rigidity of the cervix—these measures almost never failing to cause the cervix to become very soon soft and distensible. Just before the beginning of the second stage, especially in primiparæ, it is advisable to give, unless there be contra-indications, an additional dose of fifteen grains, or even more, so as to produce a decided degree of partial anæsthesia during the expulsive effort.

This method of exhibiting the drug may sometimes produce nausea, and when this is the case, or when we suspect an irritable condition of the stomach, it may advantageously be given per rectum, in the form of an enema, in the same doses as by mouth. The enema may be a simple aqueous solution, or, better, the drug may be beaten up with gruel, or with a raw egg and a little milk, and whisky or brandy, if indicated; the whole to measure about two ounces. Kane[1] recommends the addition of ten minims each of tinct. of opium, digitalis, and belladonna to each thirty grains of chloral. I have found this combination to be excellent in cases where I have used it. The addition of from one-eighth to one-third of a grain of sulphate of morphia increases markedly, in nearly all cases, the hypnotic and anæsthetic effects of the chloral.

Chloral has also been found a valuable agent in the remedial treatment of puerperal eclampsia, especially when combined with large doses of morphia; it should be given in one dose of twenty grains, and should not be repeated, as it is here apt to produce dangerous symptoms. The morphia should be given in large doses (½–¼ gr.), and hypodermically,[2] and this apparently hazardous treatment seems not only safe but efficient.

In threatened abortion, chloral often acts in a most happy manner. It is best used combined with rest and morphia, and may be given in ten or fifteen-grain doses every hour, as may be necessary and safe.

[1] *Am. Jour. of Obst.*, 1881. Vol. XIV, p. [illegible]

[2] [illegible] Clark, of Oswego, N. Y., may be said to be the pioneer in this method of using morphia in eclampsia.

A saturated solution, given in one-drop doses every five minutes, so long as may be necessary, up to fifteen doses, is exceedingly efficacious in relieving the nausea and vomiting of early pregnancy. One-drop doses of comp. tinct. of iodine will also be found useful in this condition.

It must be understood that chloral, in the doses recommended above, should only be given when the patient is under the immediate supervision of the physician.

Morphia.—Morphia as an anodyne, hypnotic, and antiphlogistic agent—this latter especially in the inflammations of serous cavities, stands unexcelled. It is not my intention here to discuss the minutiæ of its action, or the *pros* and *cons* concerning its use, but to state briefly under what circumstances and how we, as obstetricians, should use the drug.

In threatened abortion, morphia in full doses, combined with perfect rest in the recumbent position, and cold applications to the hypogastrium, is the most powerful agent we possess to lessen the irritability and congestion of the uterus and prevent the impending dislodgment of the ovum.

It is also a reliable means of checking the pseudo-pains, which so frequently come on just before term, though I prefer chloral, oftentimes combined with an agent to clear out the lower bowel, for this purpose.

When the os is rigid, and dilatation slow and painful, so that the patient becomes exhausted and the uterus unable longer to contract, this drug is again of great value, procuring for the sufferer refreshing sleep, during which nature can remarshal her forces and gain strength to carry the labor to a successful termination.

It is, however, in pelvic inflammation, especially peritonitis, that morphia is most indispensable; here, with the first appearance of the symptoms, it should be given in amount sufficient to relieve pain, and this, with appropriate local treatment, may be all that is necessary; if, however, the disease should become general, it should be given boldly, the dose being measured only by the effect—enough being used to relieve pain, to diminish peristalsis, and to keep the patient in a somnolent condition—and continued until the danger is passed.

This method of controlling general peritoneal inflammations, by the exhibition of heroic doses of morphia, now admitted to be one of our best methods for its treatment, was first instituted by Dr. Alonzo Clark, who achieved most gratifying results from its use.

Quinine.—In addition to its systemic tonic effects, its specific action in malarial disease and its power of reducing temperature, we have in quinine an agent which, if not always certain in its oxytocic effects, is safe, and, in the majority of cases, effective in its action.

In my experience it has nearly always markedly stimulated flagging pains, and, in any case, has increased the energy of uterine contractions when once labor has begun. As an abortifacient, I do not think it has any marked

power, except when given in overwhelming doses, and where abortion is threatened as a consequence of malarial toxæmia it has been proved to be one of the most effective means for diminishing the uterine irritability.[1] I have always found that I produced as marked oxytocic effects from doses of from ten to fifteen grains by mouth, or fifteen or twenty by rectum, as from the exhibition of larger amounts, and have seldom found it necessary to repeat the dose. The hydrochlorate or hydrobromate are the most efficient and least disagreeable in their after effects, though more expensive than the sulphate.

When aqueous solutions of quinine and chloral are mixed, a white, pasty precipitate is thrown down—a fact to be remembered when prescribing these two drugs.

Gossypii Radix.—A decoction of cotton-root has long enjoyed a reputation among the negroes of the South as an abortifacient and oxytocic. From some of the statements published, there would seem to be good reason for regarding it as energetic as ergot. I have never employed it as an oxytocic, and it is needless to say never as an abortifacient, though in metrorrhagia from subinvolution of the uterus I have used it extensively and with the best results. Indeed, a favorite prescription of mine for the condition just referred to contains equal parts of fl. extr. gossypii radix and extr. ergotæ fl., with a smaller proportion of cannabis indica. The dose of the cotton-root is from half a drachm to a drachm of the fluid extract of the root every two to three hours. The decoction of the root is made by boiling four ounces of the inner bark in one quart of water until reduced to one-half. The dose of this is a wineglassful every twenty to thirty minutes.

Viscum Album.—The fluid extract of mistletoe has properties much resembling those of ergot, though, while it produces energetic contractions of the muscular fibres of the uterus, it does not tetanize them, and, consequently, may be given when ergot would be dangerous. Though not as reliable as this drug, I have used it with great benefit in doses of from one-half to one drachm every half or three-quarters of an hour, up to three or four doses, in cases where the uterine contractions were sluggish, or to check menorrhagia from subinvolution in cases where ergot disagreed. It should be mentioned that the inspissated extracts of gossypium and viscum album act equally well in suppositories.

Viburnum prunifolium: V. opulis.—Black Haw is supposed to have a specific action on the uterine muscular fibre diametrically opposed to that of ergot and other oxytocics, namely, a sedative effect. Experience has shown that it is one of our most valuable epichontocics, its special indications being in threatened abortion, in premature labor and in dysmenorrhœa of the spasmodic variety. I consider it a standby where the symptoms are not very

[1] Campbell. *Gynæcol. Trans.*, Vol. V, 1880, p. 293 *et seq.*

threatening—as in habitual abortion—and using it in connection with rest and morphia, have gotten the most satisfactory results.

Viburnum is particularly applicable in those cases where morphia is contra-indicated, and, though rather unpleasant to the taste, is well borne, even by the most delicate stomachs. It may be given in doses of a drachm, every fifteen to thirty minutes, up to a half-ounce.

Cocaine Hydrochlorate.—I have found this drug chiefly useful as a sedative agent in the nausea and vomiting of early pregnancy, where it produces surprising effects, given in a dose of from one-twentieth to one-tenth of a grain; a very elegant means of administering it being in the gelatine capsules now prepared by pharmacists. In obstinate pruritus vulvæ a four per cent. oleate locally applied will often relieve when all else fails. The oleate is also useful in the treatment of fissured nipples. As a local anæsthetic in labor I do not believe it to be of much value, the surfaces involved being too extensive, and its effect too superficial and evanescent.

Hyoscyamine Sulphate.—Hyoscyamus, in obstetric practice, has been used as a local anodyne application to inflamed and painful breasts, with practically the same effects as those obtained by the use of belladonna, and its alkaloid as a sedative and as a "vegetable strait jacket" in acute postpuerperal and other forms of mania. I had not heard of its use during labor until, recently, Dr. Wells spoke to me of a case where he had used the hyoscyamine sulphate as a sedative and anæsthetic, with good results, a marked oxytocic effect being noted.

The patient was a young and healthy primipara, but was exceedingly excitable and hysterical. The first stage progressed slowly, the uterine contractions being painful and inefficient. When the os was about three-fourths dilated, the patient having been in labor about twenty hours, she became perfectly frenzied, shouting and screaming in an insane manner, and throwing herself about so violently that the assistance of several persons was necessary to prevent her from doing herself severe bodily injury. It was known that she did not bear morphia well, and thirty grains of chloral previously given had produced such cardiac depression that it was not considered safe to give her more, and having a solution of hyoscyamine sulphate (Merck's) with him, Dr. Wells injected a tenth of a grain hypodermically. In between five and six minutes the excitement had subsided, the pupils became dilated, voluntary muscular motion was enfeebled, the face began to show the characteristic hyoscyamine flush, and soon the patient passed into a deep sleep; the respirations became full and slow, and the pulse, which had been rapid and rather weak, slow, strong and regular. The effect on the uterine muscle was watched with much interest; the contractions, slightly increased in frequency, became much stronger and much more efficient, so that at the end of an hour the patient was delivered of a fine boy, weighing 8 lbs., 8 oz. There was no hemorrhage, the placenta and membranes were

spontaneously expelled fifteen minutes after the birth of the child, the uterus immediately contracting firmly and permanently. The patient remained absolutely anæsthetic during the delivery, and for nearly an hour after, when the effects of the hyoscyamine began to pass away, though she slept most of the time for three hours. She awoke feeling refreshed, was perfectly rational, but would hardly believe that she had been delivered, until she was shown her child. There were no unpleasant after effects whatever, except a slight paralysis of ocular accommodation, lasting about six hours. Convalescence was normal.

Dr. Wells was led to give the drug in this case from his observation of its good effects in acute post-puerperal mania, and did not know of its ever having been used during labor. From its known slightly stimulant effect on unstriped muscular fibre he had expected that it at least would not weaken the muscular contraction of the uterus, but he was agreeably surprised at the marked oxytocic effects noted. As the strength of the drug varies somewhat it is well to assure ourselves of the activity of any particular specimen, by the use at first of smaller doses, they being repeated if necessary.

The salts of *hyoscine*, especially the hydrobromate, from results observed in other departments of medicine, will probably prove useful in many cases where chloral is now used, and certainly deserve trial. They may be used in doses beginning with one-sixtieth of a grain, increased cautiously, as may be necessary.

Electricity.—No one in this age of progress can dare to say where or when the limits of electric power or application will be reached. In medicine, as well as in the other branches of scientific research, new uses and properties are continually being discovered. To the obstetrician its study is of considerable interest, practically as well as theoretically, and though its known uses in this department are many and valuable, more probably remain to be discovered.

One of the greatest objections to its use, and one which has practically confined it to the office or hospital, is the bulk and weight of the apparatus necessary for its production; both of these disadvantages, however, have been of late considerably reduced.

It requires no special talent and no prolonged study of its mysteries to enable an obstetrician who is competent to correctly diagnose his patient's condition, and deduce therefrom the proper indications, to employ electricity with safety and benefit.

The apparatus need be neither complicated nor very expensive, a reliable faradic apparatus and a portable galvanic battery of from twenty to thirty cells, with current interrupter and reverser, electrodes and cords, being all that is necessary.

Of electrodes we need five: two round, flat sponges about two inches in diameter, fastened on metal disks which are screwed into universal wooden

handles, to which the conducting cords are attached; to be used for external application over small portions of the skin of the abdomen or back. A large flat sponge, six by three inches in size, covered on one side by rubber cloth, which slightly projects beyond the edge of the sponge, and provided with protected metal attachment for the connecting cord, to be used where we wish a larger surface to be included in the current. A bracelet electrode for attachment to the wrist when the hand is used as an electrode; and a metal electrode with a ball about one inch in diameter, attached to a steel sound covered with elastic catheter, and furnished with a screw for attachment to the universal handle; this is used for applications to the cervix and vaginal vault, and through them to the uterus and adnexa, and should be covered with tight-fitting chamois leather, which should be renewed for each case, the covering preventing the escharotic effect observed at the negative pole of a galvanic current when the current is strong and continued for some time (over sixteen cells, and longer than five minutes). The sponge electrodes may, for purposes of cleanliness, have a piece of canton flannel tied over them, which may be changed at each time of use. These electrodes, while being used, should be kept well moistened with warm water, to which a little salt has been added.

It should be remembered that the fresher the fluid in the battery the more powerful will be the current, and the oftener and longer the battery is used, the weaker it becomes, so that more cells have to be used to produce the same effects. When the constant current produces pain it is too strong or is doing harm, and should be reduced in strength or stopped.

Either the galvanic or faradic current may be employed with about equal results in the following conditions: *vomiting of pregnancy, to induce premature labor, to destroy the life of an extra-uterine gestation, as an oxytocic in normal or complicated labor, in subinvolution.*

In the *vomiting of pregnancy* the electric current may be used with considerable advantage where the condition causing it is purely neurosal in character. A moderately strong current is necessary, which may be applied in each of several ways; thus a current may be passed directly through the body, one electrode being placed over the epigastric region and the other on the back, or both electrodes may be placed a little distance from each other on the abdomen over the stomach, or one electrode may be placed at the angle of the jaw and the other at the epigastrium, or both may be applied to the spine, or one placed at the epigastrium and the other rubbed over the course of the spine, the current being either continuous, interrupted or reversed. I have found the last method, with the galvanic current slowly interrupted or reversed, to produce the best results. Lente was, so far as I know, one of the first to employ faradism for this purpose.

In *the induction of premature labor*, electricity is used with a certain measure of success and perfect safety, though it often fails to accomplish its end. The application is made by placing the vaginal electrode against the cervix and the small sponge on the abdominal wall, over the fundus, using

a pretty strong galvanic current slowly interrupted. The external electrode should be moved about with a pawing motion, and, to prevent the formation of an eschar, the position of the cervical one changed occasionally. The current should be passed for about fifteen minutes, and repeated five or six times, each time a little stronger, at intervals of a few hours. This treatment causes the cervix to dilate and regular uterine contractions to set in. The faradic current may also be used, but does not seem to produce as good results; it would seem to be indicated especially when the cervix has already been dilated, to incite stronger uterine contractions.

The electric treatment of *ectopic gestation* is discussed in Article XIV, to which the reader is referred.

As an Oxytocic.—Though I have used it but little for this purpose, for reasons above stated, there is but slight doubt in my mind that electricity is the best and most manageable of oxytocic agents. Its value in the treatment of conditions of uterine inertia has been recognized for some years, though but superficially referred to in all modern works on obstetrics.

It is well known that when passed through the uterine muscle, it adds to its strength and tone, increasing the vigor of its contractions, thus favoring a more rapid dilatation of the os and shortening the time of labor; and that in post-partum hemorrhage from an atonic uterus, it is the most certain and valuable agent which we can use, stopping the hemorrhage, by producing an almost instantaneous uterine contraction.

Baird,[1] in an elaborate paper recently published, giving results obtained by him by the use of faradism in some 220 cases, claims, in addition, and proves pretty conclusively, that electricity, properly used, will lessen the pain of the uterine contractions, and, by preventing an undue expenditure of nervous force, diminish shock and exhaustion in cases of debility from any cause, thus leaving the patient in the best condition to secure speedy and favorable convalescence.

From our present experience, a viable fœtus does not seem to be affected injuriously by the faradic current if the current be not excessively strong or passed directly through its head; for this latter reason, we should avoid placing an electrode against the head or in the vagina.

The best method of its application, the one described by Baird, is as follows: The patient is placed in the dorsal position, and the cords attached to the electrodes; one, the large, flat sponge, being applied to the sacro-lumbar region; the other, the bracelet, attached to the wrist, first covered with a napkin wet with warm water, of the hand with which the application is to be made. The battery being now set in action, the circuit is closed by the application of this hand, also wet with warm water, to the abdominal parietes. The application made in this way enables the operator to correctly estimate the strength of the current which he is applying, and, the hands being more sensitive to the current than the abdominal walls, as long

[1] *Am. Jour. of Obstet.*, vol. xviii, 1885, p. 457 *et seq.*

as he continues the operation through his hand there will be no danger of producing any unpleasant effect upon his patient; on the contrary, a current as strong as can ordinarily be borne by the operator's hand will produce a pleasant and soothing effect. He can also note the exact condition of the uterus, the changes which occur in its contour, and the amount of increase which occurs in its contractions; he is enabled to perform uterine manual pressure, and should it be necessary to use both hands for this purpose, it can readily be done, each hand then conveying the current to or from the uterine walls.

It is always best to begin with very mild currents, and to increase them gradually to the required strength. The application of the hand should be continuous until a sufficient amount of sedation is produced (from five to thirty minutes), when it should be removed in the interval between the contractions, the circuit being closed again when the pain recurs. *When all reflex pain has been subdued, and the patient rests well in the intervals, keep the circuit closed only during the time occupied by the rhythmical contractions of the uterus.* The danger of destroying the electro-muscular contractility of the uterine fibre, which we wish to strengthen and stimulate, and which would probably be paralyzed did we keep the circuit closed continuously, is effectually guarded against by the intermittent application. Dr. Baird has used it in this manner for twenty-four hours in a case of tedious labor, "and during all this time it furnished to the nerves and muscles all the elements of increased *strength* and *rest*, as was fully evinced by the ability of the patient to withstand her pains, and by her earnest desire, often reiterated, not to allow her to have a pain without closing the circuit."

When the operator is tired, or it is necessary to support the perineum, the nurse can make the applications.

At the beginning of the second stage the current is increased in force as much as the patient can bear with comfort, and it will be found that the stronger the current used in this stage, short of producing spasmodic contractions of the abdominal muscles, the better it will suit the feelings of the woman. When the perineum is well dilated, the force of the current should be moderated, and when there is reason to fear danger to its integrity, withheld entirely, so as to give time for its safe dilatation. After the head has escaped, the circuit is to be closed most of the time, until the third stage is completed, which will usually be in a very few minutes. In all of Dr. Baird's cases the placenta has been expelled in from one to ten minutes from the birth of the child, with very slight traction upon the cord.

In *subinvolution*, which may exist from three to six months after a confinement or abortion, the uterus is abnormally large, soft, succulent and vascular; both its muscular and vascular elements require contracting, and the circulation needs stimulation, in order to hasten the normal retrograde metamorphosis. Therefore, the *faradic* current is especially indicated. But if the subinvolution is less recent, and the uterus has become somewhat dense and hard, the constant current will act very well in promoting absorption of

the adventitious elements. The rapidly interrupted *constant* current will often be found more useful than the faradic in these cases.

As subinvolution is usually accompanied by menorrhagia, or even metrorrhagia, it is best not to irritate the endometrium by sounding; hence, intrauterine electrization should be avoided, the current being passed through the ball electrode applied to the cervix.

Frequent, mild sittings are necessary, except where there is menorrhagia, when the strongest faradic current only should be given, in order to produce as powerful a contraction of the uterus as possible. Usually, however, the effect will be gradual, and only little by little will the uterus diminish and the profuse flow decrease.

II.

POSTURE IN OBSTETRICS.

A STUDY of posture in its relations to obstetric practice will naturally include those positions that sometimes may be advantageously given to the patient as accessory or directly curative measures in the treatment of certain malpositions of the fetus, the various attitudes in which delivery may be accomplished and the postural treatment of the puerperal state.

An intelligent understanding of the *rationale*, use and effect of various postures in certain abnormal conditions will often enable us to find the means of remedying others by the same or similar measures. Thus, when the head at the superior strait is not properly or sufficiently flexed, lying in any position between the normal and face, we can often, by merely placing the patient in the lateral decubitus on the side toward which the occiput points, cause the wished-for flexion to occur.

With the chin posterior, the mother may be placed upon the hands and knees, and kept in this somewhat awkward position during several pains, when examination will often reveal the vertex; the *rationale* of the procedures being, that we place the mother in such a position that the weight of the child transmitted to the base of the skull tends to press it toward the side where the occiput lies, and, therefore, to give it the position of flexion. These postures may be used advantageously in conjunction with manual efforts at cephalic replacement.

In shoulder presentations the decubitus on the side toward which the head is displaced, the pelvis at the same time being somewhat elevated, will often allow us to perform cephalic version after the manner of Hicks with remarkable ease, and even in neglected cases, where podalic version would seem to be the only resource, we can often, by placing the patient in the genu-pectoral position, and thus causing the weight of the fetus and the abdominal contents to aid instead of oppose our movements, bring the head to the brim; and, indeed, several cases are reported where, in shoulder

presentations, spontaneous version has occurred after placing the patient in this position.

Again, when the uterus lies in such a position of lateral obliquity that the contractions act at a disadvantage, forcing the head more against the pelvic walls than downward, we can remedy the condition by the appropriate lateral decubitus, the change from back to side always producing marked improvement in the efficiency of the pains.

When our examining finger detects through the unruptured membranes the pulsating loop of the umbilical cord, postural treatment is of the greatest value and should always be resorted to, the patient being placed so that gravity removes the weight of the child and abdominal viscera from the pelvic brim and tends to cause the cord to slide back into the cavity of the uterus, these ends being best accomplished with the patient in the knee-breast position, the reposition being aided by gently moving the abdomen to and fro. This position should also be assumed when the membranes have ruptured and where instrumental reposition becomes necessary, it rendering it much more certain and facile. After reposition has been accomplished, the woman may again resume the dorsal or lateral decubitus, the transition being made during a pain, when the head, forced against the pelvic opening, prevents the fresh prolapse of the funis. To Thomas belongs the credit of popularizing this method, he having first used it in 1858.

During the first stage of labor, and until the os is nearly fully dilated, or the head low down in the pelvic cavity, the parturient may safely be left to follow her own whims in regard to posture. When the first teasing pains appear, she is apt to sit, and in such a position that she can press with the hands upon the sacrum or sides of the pelvis. As the contractions become more frequent and stronger, she becomes restless and walks about, on the approach of a pain grasping a support, leaning forward and sometimes pressing the abdomen against any convenient object, as a table, or chair back, or the footboard of the bed. She should be allowed and encouraged to move about in this way until the first stage is nearly complete, the changing position being less irksome, and the weight of the child most advantageously disposed to favor dilatation. The pains, also, are more active, seeming to be stimulated by the movements of the mother. When the os is entirely dilated in a primipara, or three-fourths to four-fifths in one who has borne children, as a very few pains may now complete the labor, she should be placed so as to best facilitate the expulsion of the child.

The customs and traditions of various peoples, ancient or modern, civilized or savage, as to what this best position may be,[1] form a very curious and interesting study: standing erect; hanging more or less suspended from a tree or rope, or the neck of some friend; sitting erect on a cushion, stool or stone; squatting; kneeling on the knees and hands, knees and elbows, knees and breast, or with the body bent backward; sitting semi-recumbent on the

[1] A valuable paper, giving the results of very thorough research on this subject, was published by Geo. J. Engelmann, of St. Louis, in the Trans. of the Am. Gyn. Soc. for 1880, entitled "Posture in Labor."

ground or on some support, as a stone or stool, or on the lap or between the thighs of an assistant, on the obstetrical chair; lying semi-recumbent; lying horizontal on the back, side or stomach. All these positions and others are used, the various semi-recumbent ones being far more commonly adopted than the erect or horizontal, except throughout Europe and the United States, where the horizontal or lateral decubitus is nearly universal.

In England the women are almost always delivered on the left side, even in instrumental cases, the supposed advantages being that the patient is less exposed, and that the perineum can be more easily watched and supported. In this country and on the continent of Europe the dorsal position is most favored. In so far as exposure is concerned I cannot see that there is much difference, with the patient properly clothed with drawers and stockings, between the dorsal and lateral positions, except that the patient in the latter cannot see the extent of her nakedness or the manipulations which may be necessary. In regard to the advantages claimed for the respective positions, digital exploration may be performed with the patient in either with equal facility, while palpation and auscultation of the fetal heart can be much more easily and thoroughly accomplished in the dorsal decubitus. When the head reaches the pelvic floor the left lateral position is thought by many to be the most favorable one for attempting measures for the support and preservation of the perineum, the advance of the head being more easily regulated and the degree of perineal tension more exactly appreciated. To the beginner in obstetric practice the regulation of the advance of the fetal head seems more easily accomplished in this position, but the physician soon learns to attain his purpose with equal facility and certainty with the patient in either decubitus. The thigh muscles are more relaxed, and the abdominal muscles act to a somewhat better advantage in the lateral than in the *horizontal* dorsal decubitus, but in neither so well as in the dorsal *semi-recumbent* position, now to be described.

This position, or its various modifications, so often assumed by the women of savage peoples who, not being bound by the tradition and restraints of civilization, follow their natural instincts in physiological acts, is one which any obstetrician has seen many times assumed in the agony of expulsive effort, when the patient grasping any person near or resting on the hands or elbows, raises the shoulders and upper part of the body from the bed. Many times, in labors which were slow, the pains being inefficient, and where turning the patient from back to side has not produced any effect in increasing their force oftentimes a change in posture will increase the pains, causing the patient to sit or recline with the body at an angle of thirty or forty degrees has produced an almost immediate termination of the labor. And again, where the pains were strong but not effective, the woman has begged to be allowed to sit up or kneel, and permission being given, the child has been born at once. Even where it has been considered advisable to apply the forceps, the child has been expelled as soon as this posture was assumed. I might cite numer-

ous instances of the benefits resulting from this position, but enough has been said to show my meaning.

There need be no unusual exposure, the position is comfortable, the pains seem to be less severely felt, the thigh muscles are very perfectly relaxed, the abdominal muscles can contract more forcibly and to better advantage, and the weight of the child and superimposed viscera aid the uterine contractions. My preference, for most cases, and for the reasons given, is in favor of the *dorsal semi-recumbent* position, the shoulders and body being raised to an angle of about thirty-five or forty degrees, which can easily be done by raising the mattress on the back of an overturned chair placed under it at the head of the bed, or by other simple means which readily suggest themselves.

Every physician should accustom himself, however, to examine and to deliver patients on either the back or side, it often being to his interest to deliver the woman in whatever position she may have been accustomed to in former confinements; and often in tedious labors a change in posture is both pleasant and resting to the mother and stimulating to the pains. Should the patient be delivered on the side, the dorsal decubitus should be assumed after the completion of the second stage, for in that position the remaining contents of the uterus are more easily expelled, either by natural efforts or by Crede's method, the uterus is more conveniently and easily held and compressed, and hemorrhage more surely guarded against.

Any one who has held a flaccid uterus after delivery for any length of time with the patient on the side, and again with her on the back, will appreciate forcibly the truth of these remarks, as well as the advantage of the dorsal decubitus.

In instrumental deliveries or where podalic version is to be performed, the woman should lie flat upon her back with the nates just at the edge of the bed, and the legs either held by assistants or supported on chairs. Though the forceps could as easily be applied and traction as easily made in the lateral position, abdominal manipulations, which are often of the greatest value, can only be awkwardly and imperfectly performed with the subject in this decubitus.

After labor the woman should be kept strictly in the recumbent position for a number of days, generally from seven to nine, or until the uterus has become involuted, so that it no longer is felt above the pubis, being allowed to lie on the back and on either side alternately, the choice of the position being oftentimes influenced by some prëexisting displacement of the uterus, the puerperal period being peculiarly favorable for its treatment; thus, when we know that the patient had before gestation a retroversion or flexion of moderate degree, we can often, by causing her to lie alternately on either side and not on the back while the uterus is large and heavy, rectify the malposition, and by fitting a pessary before the patient walks, and letting her wear it for several months, we occasionally get a permanent cure.

When the retro-displacement has been very marked, it is advisable to keep the patient in the lateral recumbent position, preferably dressed and on a lounge, so as to avoid the evil results of confinement to bed for a long time and until the uterus has become involuted to such an extent that it will not bend over the posterior bar of the pessary when the patient walks about, as it is extremely apt to do while it is large, soft and flabby, involution being accelerated by ergot at the same time that the vaginal walls are made more tolerant by the use of astringent tampons and injections. A pessary should be fitted as soon as possible and worn for months.

In ante-displacements the patient should be encouraged to lie on her back, and a suitable pessary fitted after ten or twelve days.

Where there is a tendency to descensus, the patient should be kept in the horizontal position, and where the displacement is marked, should have the hips somewhat elevated. She should not be allowed to stand erect or walk until involution is well advanced, and in this case, as in the other, astringent tampons and douches prepare the way for the pessary, which probably will be needed.

Dr. Goodell, of Philadelphia, allows his patients to get up on the fourth or fifth day after confinement, and states that he finds no evil consequences resulting from the practice. I believe that, while in many cases no harm might result from so doing, in others, allowing the patient to walk about while the uterus is still so large and heavy would be a very risky proceeding, tending strongly to increase any existing displacement, and even to produce one where none had existed before.

REPOSITION OF THE GRAVID UTERUS BY POSTURE AND ATMOSPHERIC PRESSURE.

In the month of January, 1876, a patient came to me complaining bitterly of symptoms which pointed towards a displacement of the gravid uterus.[1] A vaginal examination revealed the uterus in a state of acute retroflexion, the enlarged body and fundus occupying the cavity of the sacrum, and firmly compressing the rectum and the cervix, situated under the symphysis pubis. Below the fundus was the enlarged, exquisitely sensitive left ovary. The size of the uterus and the soft, doughy feel of the body, indicated a pregnancy of about ten weeks; while the tenderness of the organ on pressure clearly showed the necessity for speedy interference and the reposition of the dislocation. The symptoms of incarceration were not present, that condition generally not arising until the end of the fourth month, and although the existence of a retroflexion fortunately prevented the compression of the urethra by the cervix uteri and the consequent partial or total retention of urine, which would doubtless have been present had the case been one of retroversion, still, two cases of miscarriage during the tenth and twelfth weeks, in which the reposition of the retroverted uterus and a lever pessary after the commencement of the metrorrhagia proved

[1] Reported in [illegible]

unavailing, had shown me the danger of abortion, even at that early period, unless the displacement was soon reduced. I at once placed the patient in the genu-pectoral position and introduced two fingers of my right hand into the posterior cul-de-sac of the vagina; this not succeeding, I passed the same two fingers into the rectum, and endeavored, for about five minutes, to dislodge and push the body of the uterus above the brim of the pelvis, but without success. The complaints of the patient and the fact that her bowels had not moved for several days, induced me to desist from my efforts and to send the patient home, with instructions to thoroughly evacuate the bowels and to return the next day with an empty bladder. She did so, and I renewed my efforts as before, but having used as much force as I dared, and having caused great pain, I found that I had not succeeded in elevating the fundus at all, and that the cervix still retained its original position above the pubic arch. Having, in a number of cases of retroflexion or version of the gravid uterus, succeeded, without difficulty, in replacing the organ in the manner indicated, I thought that there must be some special reason for my want of success in this case—perhaps adhesions, which were possible, since the patient could not date the displacement to any sudden accident; and it might, therefore, have existed for some time before the present impregnation took place. I determined, however, to try, first, whether, by drawing the cervix away from the pubis and toward the floor of the pelvis, I could not dislodge the fundus and reduce the dislocation by simultaneous digital pressure per rectum. This I had already tried with the finger, but without avail. The patient being still in the genu-pectoral position, I introduced Sims' speculum into the vagina, and pulled up the perineum sharply, intending to seize the cervix with the double tenaculum, when I suddenly noticed that the vagina was distended with air, like a balloon, in the middle of which appeared the cervix. On looking for the body of the uterus, I found, to my surprise, that it had disappeared, that the sacral excavation was empty, and that the obstinate retroflexion of the gravid organ had been unwittingly and painlessly reduced. The patient immediately expressed her sudden and entire relief from the previous distressing symptoms, and I hastened to secure the uterus by introducing a proper Albert Smith pessary, which the patient wore with perfect satisfaction and comfort until the beginning of the fifth month.

The explanation of this phenomenon is perfectly simple and obvious. The forcible elevation of the perineum opened the introitus vaginæ, and gave entrance to a volume of air, the pressure of which had already been pushing up the perineum, slightly drawn inward by the downward gravitation of the abdominal viscera, and the pressure of which, when admitted, instantaneously distended the vaginal pouch and replaced the uterus—a mechanism identical with that on which the action of Sims' speculum was founded. However, I did not remember seeing this method of reposition of the retrodisplaced uterus, gravid or unimpregnated, recommended in any of the works on obstetrics or gynecology, and, on looking over those at my disposal, such as

Scanzoni, Schroeder, Byford, Cazeaux, Leishman, Thomas, Barnes, Hewitt, I found that while all recommend the usual manipulations for the reduction of retroflexions and retroversions of the unimpregnated and gravid uterus, as by fingers in the rectum or vagina, or by air or water-bags in these passages (Favrot); or by pressing the fundus up with a drumstick or ivory-headed cane in the rectum (Byford); or by drawing down the cervix with one hand, while the other pushed up the fundus, the patient generally being in the knee-chest or semi-prone position; and, while all these authors agreed that the reposition of the uterus with the sound was always attended with more or less danger and pain, still, not one even as much as hints at the employment of atmospheric pressure for this purpose. Even Sims himself, whose attention might naturally have been supposed to be directed to this manner of replacing retro-deviations, from the manner of the discovery of the principle of action of his speculum, entirely ignored the method, recommending the reposition of the retro-displaced uterus by the fingers and three sponge-holders, or by the uterine elevator. I afterwards found that T. A. Emmet had noted, in an article which appeared in the *American Journal of Obstetrics*, February, 1869, entitled, "Surgery of the Cervix, in Connection with the Treatment of Certain Uterine Diseases," a case where he had replaced the retroverted non-pregnant uterus in a similar manner to that above described. During a discussion on a paper by Dr. Fred. H. Gervis, on "Retroversion of the Gravid Uterus," at the meetings of the London Obstetrical Society, in November and December, 1884 (*Obstet. Jour., G. B. & I.*, December, '74, and January, '75), which was the latest published general discussion on the subject, Barnes, Wynn Williams, Aveling, Gallabin, Braxton Hicks, Palfrey, Godson, Edis, Hay and others, related their experience in forty-eight cases, eight of which were fatal, and the treatment employed and advocated, but not one word of air-pressure as a repositor do I find among all the methods recommended. It is evident that none of the gentlemen named had ever heard of it in that connection.

On January 6th, two days after the reposition of the displacement, as above described, the latest number of the Berlin *Beiträge zur Geburtshülfe und Gynäkologie* (Vol. IV, No. 1) came into my hands, and looking it over, I noticed an article entitled, "A Hitherto Unrecognized Obstacle to the Reposition of the Retroflexed Gravid Uterus," read by Dr. Solger, of Berlin, before the Obstetrical Society of that city, May 11th, 1875, in which, after enumerating the various well known obstacles to the reposition of the retro-displaced gravid organ, such as distention of the bladder and rectum, projection of the sacral promontory and impaction of the fundus in the sacral excavation, and retro-uterine adhesions, mentions a new, hitherto not recognized impediment, viz., the normal intra-abdominal pressure, and relates his experience in a case of difficult reposition, in which he made exactly the same observations as I had done, although in a slightly different manner, identical with the original observation of Dr. Sims. In one case of irreducible retroflexion of the gravid uterus at the end of the fourth

month, in which Solger vainly endeavored to replace the organ by the fingers and the colpeurynter, in the knee-chest position, he seized the cervix with the double tenaculum, to draw it away from the pubis, and while examining with the finger to see whether the tenaculum was in the right place, the cervix and tenaculum suddenly made a spontaneous evolution, and the cervix was found high up in the sacral excavation, from which the fundus had disappeared.

Solger concluded that this voluntary reduction was owing to the influence of the negative intra-abdominal pressure in the knee-chest position, and was reminded of a case of severe incarceration, in which violent emesis, in the knee-chest position, brought about the spontaneous replacement of the uterus. Still, he was not completely satisfied with this explanation, which I regard as the true one, and it was not till about a month previous that a new case afforded him an opportunity for ascertaining what he considered the true rationale of this phenomenon. After repeated unsuccessful efforts to replace the retroflexed uterus of three and a half months, in the knee-chest position, with the fingers in the rectum and vagina, Solger again introduced his fingers into the vagina, for the purpose of drawing the cervix away from the symphysis, when he heard and felt the air rush into the vagina between his fingers, which at once found themselves in a large balloon-like space, bounded above and behind by the sacrum. The retroflexion was completely replaced! This unexpected and surprising result he attributed to the overcoming of the intra-abdominal pressure, equal to at least one hundred pounds, by the atmospheric pressure, which, taking the antero-posterior diameter of the superior pelvic strait at only 8 cm., or 3″, at fifteen pounds to the square inch, amounted to more than one hundred pounds, aided by a negative intra-abdominal pressure not exceeding, according to Schatz, 10 cm. hydraulic pressure, and the weight of the uterus itself. He recommends to replace all retroflexions of the gravid uterus by placing the patient in the knee-chest position and admitting air to the vagina. Only in case of this manipulation failing to be successful, is the employment of manual or instrumental pressure justifiable.

Solger's explanation of the *modus operandi* of the method is not in all points correct; for while in the knee-chest position the intra-abdominal pressure is removed and a negative pressure substituted, by reason of the gravitation of the abdominal viscera away from the pelvis, there is no such enormous force acting as the one hundred pounds of atmospheric pressure which he speaks of, the entrance of air into the vagina merely balancing the upward pressure of the atmosphere by removing the tendency to the formation of a vacuum, which there would be if the uterus should replace itself with the vagina closed, and allowing the downward pull exercised by the weight of the viscera and the uterus itself to act, precisely as in the classic experiment with the Magdeburg Hemispheres, which, though they can only be separated by enormous force so long as the vacuum within is maintained, drop apart when air is admitted.

Dr. Henry F. Campbell, of Augusta, Ga., had at this time written a paper bearing upon my subject, entitled, "Position, Pneumatic Pressure and Mechanical Appliance in Uterine Displacements" (*Atlanta Med. & Surg. Jour., May*, '75), in which he said that although the knee-and-breast position had been known and practiced in reducing uterine displacement for many years, it was but little appreciated, and that no one had mentioned "the indispensable condition of power and the real instrumentality and *sine qua non* in the process of replacement, the *pneumatic* pressure." He recommends the employment of the knee-breast position and pneumatic pressure together in all varieties of uterine displacement, not only to aid the diagnosis and replace the dislocated uterus preparatory to introducing a pessary in the same position, when it can be gently laid on the posterior vaginal wall without forcibly pushing up the displaced organ (the only way in which a pessary should be applied), but chiefly for the purpose of enabling the patient to reduce the dislocation herself every evening before retiring to bed, and thus secure an unimpeded uterine circulation with unstretched uterine ligaments during the whole night, a process which, if regularly repeated for some time, will, he asserts, "go far in favoring a restoration to a permanently normal position of the organ." This self-replacement is rendered practicable by means of the "pneumatic self-repositor," a glass tube with slightly curved bulbous extremity, made of different sizes, which the patient introduces every night in the knee-breast posture, only for a moment, when "the air rushes in, the suction is broken, and immediately, whatever may be the displacement, unless there is adhesion or impaction, self-replacement is completely and instantly accomplished."

Dr. Campbell also advises the postural and pneumatic pressure treatment in the various forms of displacement of the gravid uterus, which "are not only incident to, but are almost normal attendants of, the earlier months of pregnancy;" and is confident that many of the discomforts and dangers accompanying these conditions will be alleviated or removed by nightly "self-replacement."

Rectal inflation was also recommended by Dr. Campbell, as it is by Dr. Emmet (*loc. cit.*), as serviceable in some cases, "to dislodge the fundus from the hollow of the sacrum, thereby making restitution by vaginal inflation and inverted gravity easier and more certain."

A very important, distressing and peculiarly obstinate class of cases in which postural treatment alone is of marked benefit are those in which one or both of the normal or enlarged and congested ovaries have slipped down behind the uterus, and produce the most agonizing torture at almost every movement of the patient. Dr. Campbell entirely omits all mention of these displacements, although they are very common in connection with those of the uterus. I am confident that the knee-breast position—particularly if reinforced by the admission of air to the vagina—will prove very soothing and beneficial in these cases.

While Dr. Solger's observation differed from mine, in that he did not recog-

nize the advantage offered him by the employment of Sims' speculum for the admission of air to the vagina—and this is by no means a mere nominal advantage, as I have ascertained by experiment, for it seems almost essential to a complete distention of the vagina to lift up the perineum—it will be seen that Dr. Campbell covered all the ground, with one exception, that I had expected to occupy when I first made the independent observation in the case which I have recorded. I must say that, having since replaced many retroverted non-gravid uteri by the postural and pneumatic method, I am very much impressed with the truth and force of Dr. Campbell's statement; and while the subject of "nightly self-replacement" may, perhaps, meet with some opposition, on æsthetical and moral grounds, I do not hesitate to express my unqualified support of the principles of treatment advocated and my belief that its universal appreciation and adoption will be of great benefit to the suffering female sex. And especially would I call attention to the value of the admission of air to the vagina, conjointly with the old-established postural treatment, in reduction of retro-displacements of the gravid uterus—even of a severe degree—where the employment of an amount of force such as would be perfectly justifiable in case of adhesion of the non-gravid womb, would surely be productive of peritonitis or abortion. This particular class of cases was not referred to by Dr. Campbell; indeed, he excepts displacements, where there is adhesion or impaction, as not amenable to the beneficial influence of these measures. Solger's and my cases both prove that the latter condition, in its commencing stages, may often be readily relieved by this method. I need scarcely mention, therefore, that all the milder cases of this accident are, as a matter of course, controlled with correspondingly greater facility, and I believe that, only after posture and atmospheric pressure—employed in the manner described by me, knee-breast position and elevation of the perineum with Sims' speculum—have failed to reduce the dislocation, are the usual, and infinitely more difficult and painful, manipulations to be resorted to.

III.

EXTERNAL OBSTETRIC MANIPULATION.

While this article will not be as exhaustive in many respects as my paper (pp. 114) which appeared in the *Journal of Obstetrics*, in 1879 and 1880, I trust that it will be found to contain all that is necessary to a comprehension of the subject.

In justice to myself, I should state that my former paper was substantially written in 1871–2, while I was in Vienna, seven years before the publication of the work of Dr. Pinard,[1] but other momentarily more pressing work delayed its revision and publication from year to year.

[1] A Treatise on Abdominal Palpation: Pinard. Paris, 1878. Translated by L. E. Neale, M.D. New York: J. H. Vail & Co., 1885.

In the short space here allotted, I can only very briefly refer to the historical portion of the subject.

While used in a rude way from very early periods, it was not until 1668 that Mauriceau first described methods of exploration by external manipulations that could lay claim to any scientific value, and though after this, Roederer, Puzos, Levret, Jörg, Baudelocque, Kiwisch, Holst, Veit and others,[1] laid stress on its importance and improved its methods, it is only within a comparatively short time that the recognition of its value and its use has become general.

The first methodic and scientific account of version by external manipulations was published in 1807, by Wigand, of Hamburg. Those who wish to collect all the literature of the subject up to 1859, I refer to Dr. Neggerath's paper.[2] That the therapeutic application of external obstetric manipulation has attracted much greater attention than mere diagnostic palpation, is apparent from the great number of authors who have written on the subject.

External obstetric examination and manipulation may be employed both for the purpose of *diagnosis* and for *treatment*.

I.—DIAGNOSIS.

The several practical subdivisions of the procedure when used for purposes of diagnosis are: *Inspection*, *palpation*, *percussion* and *auscultation* (page 252) of the abdomen, each of these measures controlling and supplementing the others, and all combined giving certainty to the examination

The proper period for making the examination is at any time during the last month of gestation, in order that any malpresentation or abnormal condition may be detected and rectified previous to the inception of labor, or, at least, suitable preparations made to meet the probable difficulty. It is also the first duty of the physician when called to an obstetric case, to examine by external manipulation, even before he makes the controlling vaginal examination.

Preparation for Examination.—The woman, when examined, should be placed in the *horizontal dorsal decubitus, with head slightly elevated, inferior extremities somewhat flexed, abdomen exposed from pubes to epigastrium, and bladder and rectum empty.* Corsets, all constricting bands about the waist, and drawers should be removed. Any covering, however light, over the abdomen interferes with the delicacy, facility and accuracy of the examination. If there is voluntary or reflex contraction of the abdominal muscles, she should be told to open her mouth and take deep inspirations and expirations, when, during the latter, her muscles will be found perfectly relaxed. To render the examination less fatiguing to the operator, the woman should be placed close to the edge of the bed, which should be as high as possible.

[1] See [illegible] *of Obst.* 1879, page [illegible] *et seq.*

[2] The Operation of Turning by External Manipulation. *N. Y. Journ. of Med.* Nov., 1859.

A.—Inspection.

By regarding the size and shape of the abdomen, a somewhat practiced eye can form an approximate estimate of the probable stage of pregnancy, and, perhaps, also, of the position (not presentation) of the fœtus in utero; for, as a rule, we find the abdomen in longitudinal positions to be long, narrow and oval, whereas, in transverse positions, it is broad and more distended at its base, and less so above the umbilicus, which latter peculiarity might also lead to the diagnosis of twins, especially with a longitudinal furrow in the median line, and each half of the abdomen equally distended. This longitudinal furrow may be simulated by a distended bladder or arise from a peculiar formation of the fundus uteri (uterus arcuatus), and is, therefore, of but little value in the diagnosis of the fœtal position or plurality.

The skin of the abdomen generally shows numerous red or white shiny lines or striæ, which arise from its distention during pregnancy, and are owing to the rupture of the deeper layer of the epidermis, the rete mucosum, the red striæ being of recent origin and occurring principally with primigravidæ, the white marks being evidences of former pregnancy and having already undergone the process of cicatrization.

These lacerations of the rete Malpighii could, of course, only indicate a first pregnancy, as the old cicatrices do not disappear; but the fact of their being frequently seen in cases of distention of the skin by tumors, ascites, or even obesity, and on the nates, thighs, breasts, and in males, and their being not unfrequently wanting, even in multigravidæ, makes them of but secondary importance in the diagnosis of pregnancy.

The linea alba ordinarily assumes a dark color during the first pregnancy, especially in brunettes, and retains this pigmentation generally in after life, so that it can be considered a diagnostic sign only with the first child.

The umbilicus becomes gradually flatter and less depressed during the last five months of gestation, and occasionally, even, protrudes above the surrounding skin, without, however, being at all characteristic of pregnancy, inasmuch as any considerable distention of the abdomen may produce the same result.

Should the abdominal walls not be too thick or rigid, we can often see sudden protrusions of certain parts, and rapid twitchings over the abdominal surface, arising from the motions of the child and its close contiguity to the intra-uterine surface. I have repeatedly observed the fœtal head in breech or transverse presentations distinctly recognizable by sight through the thin abdominal and uterine walls, and the smaller parts, arms and legs, can be recognized at times in almost every case. It must be borne in mind, however, for the avoidance of error, that such movements may be simulated, even at will, by contractions of the abdominal muscles and the peristaltic motions of the intestines.

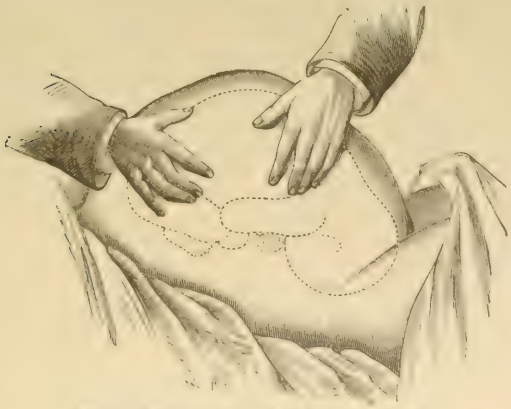
Bandl first pointed out a phenomenon recognizable by inspection of the abdomen during labor only, which is of considerable practical importance.

He found that in those cases where there exists an abnormal obstacle to the expulsion of the child, such as contracted pelvis, malpositions, etc., a distinct transverse furrow appears on the abdomen, about midway between the umbilicus and pubes, just at the junction of the cervix and body of the uterus, which is produced by the wedging of the cervix into the brim of the pelvis by the presenting part, and the concomitant fruitless concentric contractions of the uterine body. Occurring only in abnormal labors, it affords a valuable indication for the necessity of operative interference to prevent probable uterine rupture, Bandl first witnessing this sign after such an accident. I have seen this furrow in several cases where there was excessive pelvic obliquity and consequent anteversion of the uterus, a condition simulating, in its influence on the progress of labor, the minor degrees of contracted pelvis.

B.—Palpation.

The physician may stand on either side of the patient, at about the level of the umbilicus, and, having warmed his hands, should place them on her

Fig. 163.



Position of Hands in Palpation (the Abdomen *Wood*).

bare abdomen, gently and firmly pressing the *palmar surfaces* of all the fingers of both hands into the parietes, and gradually moving them about over the whole surface with slight pressing, pawing motion, keeping them sometimes together, at others separated, now examining one spot and then endeavoring to bring the uterus between the two hands; first determining the condition of the abdominal walls (1), by pinching up a fold of integument; then ascertaining the approximate period of gestation (2), by determining the height of the fundus and the general size and condition of the

abdomen; then seeking the distinctive fœtal parts (3), the presenting part and the position (4), the life (5), approximate size and degree of mobility of the fœtus (6), plural pregnancy (7), and any abnormal conditions (8) which may be present.

With a little practice, one can always determine the presentation; to be certain of the position in *all* cases requires much practice and dexterity, favorable conditions of the abdominal walls and a knowledge of the normal or abnormal positions which the fœtus may assume in utero.

1.—*The Condition of the Abdominal Wall: Obstacles to Palpation.*

The tension and firmness of the abdominal wall usually found in primigravidæ does not necessarily diminish with the increasing number of pregnancies, though it is undoubtedly more common to find the abdominal and uterine parietes the more flabby, pendulous and impressible, the greater the number of children. During the first four months, the uterine walls are firm and tense; with the increase of the liquor amnii, however, they become thinner, more impressible and pliant, until the filling out of the uterine cavity by the growth of the child, and its consequent diminished mobility, again renders them less yielding to the touch. Unusual tension of the abdominal walls or uterus, when the result of muscular action, may usually be overcome by the precautions mentioned under *Position*, and by unusual delicacy and care in the manipulations. An excess of *adipose tissue* is one of the greatest obstacles to successful palpation. In *hydramnios*, when marked, the hand can make but little impression on the elastic distended abdominal walls, and the only information of the presence of a fœtus will be imparted by the occasional thump of one of the larger parts against the hand, particularly if the presenting part be pushed up per vaginam. In slight degrees of distention, the fœtus is extremely movable, ballottement is usually distinct, and fluctuation may be felt.

Ascites and *fœtus* will rarely interfere seriously with palpation, except by increasing abdominal tension.

The presence of urine in the bladder prevents the proper examination of the superior strait, both by the resistance it offers to the palpating fingers and the pain induced by their pressure.

Unusual tenderness of the abdomen is generally only partial, in spots, where the constant kicking of the child has produced a feeling of soreness, or where the fœtal head presses firmly against one or the other inguinal region. This abnormal sensitiveness is rarely sufficient to preclude careful palpation, though there are instances of general hyperæsthesia of the peritoneal covering of the uterus which renders palpation unbearable.

2.—*Determination of the Approximate Period of Gestation.*

The height of the fundus uteri above the pubis is a reliable objective symptom of the period of pregnancy in normal presentations, where the uterus contains only one fœtus. It does not hold good when the fœtus occu-

pies a transverse position, nor always in case of twins, nor in contraction of the pelvic brim, nor in case of fullness of the bladder or rectum, deformities of the vertebral column or thorax, tumors or hydramnios.

The height of the fundus is ascertained by slowly passing the tips of the fingers toward the upper part of the abdomen until they can be pressed in more or less deeply toward the spinal column, when the fundus can usually be grasped and felt as a rounded, firm, convex surface. The distance from the fundus to the pubis can then easily be measured by finger breadths, or, more exactly and preferably, by the pelvimeter.

Ordinarily, the uterus is not palpable until toward the end of the fourth lunar month, when it may be felt about midway between the pubis and umbilicus as a round, elastic body with a tolerably even surface. Ballottement may occasionally be felt.

20th Week.—The fundus is about one finger's breadth below the umbilicus, generally slightly to the right of the median line; in lean persons, the voluntary motions and several parts of the fœtus can frequently be detected by the hand, and ballottement is not unfrequently felt. Average height of fundus above pubis, 19 cm.; breadth of uterus, 14 cm.

24th Week.—Fundus one finger's breadth above umbilicus. Fœtal parts more distinct. Ballottement usual. Presentation can ordinarily be made out without much difficulty. Average height of fundus above pubes 19 cm.; breadth of uterus 15.5 cm.

28th Week.—Fundus three fingers' breadth above umbilicus, distinctly inclining toward the right side. Umbilicus flat. Average height of fundus above pubes 20.1 cm.; breadth of uterus 16.8 cm.

32d Week.—Fundus midway between umbilicus and ensiform process. Umbilical fossa entirely obliterated. Average height of fundus above pubes 22 cm.; breadth of uterus 18.3 cm. In primigravidæ the head is in the median line; in multiparæ it is often found slightly to one side.

36th Week.—Fundus immediately below ensiform process. Umbilicus protrudes. Average height of fundus above pubis 24 cm.; breadth of uterus 19.8 cm. The fœtus closely touches the uterine walls; the surface of the uterus is, consequently, less impressible. That part of the uterus and abdomen in which the breech lies generally protrudes, thus destroying the spherical shape of the fundus.

40th Week.—During the last month the uterus still increases in size, and, not being able to extend any higher in a vertical direction, expands laterally under the false ribs; the integument of the præcordial region is then often so tight as to prevent the palpation of the fundus. During the last two weeks the lower segment of the uterus, and with it the presenting part, descend often quite suddenly into the superior strait of the pelvis and become more or less fixed there; consequently, the fundus leaves the præcordial region and becomes palpable again about midway between the umbilicus and the ensiform process, generally slightly higher than it was at the end of the eighth month; it has fallen forward in its descent, and the change in the

appearance of the abdomen is very perceptible, especially when the patient is standing.

3.—*Determination of the Fœtal Parts.*

Before we can proceed to make a diagnosis of the presentation and position, we must learn to know the sensations imparted to the hand by the various parts of the fœtus.

The *head*, when not engaged, is felt as a round, hard, exceedingly movable body, often giving the rebounding sensation called ballottement, obtained by making a slight, quick depression, more a shove than a blow, of the abdominal wall in relation to the head. More or less of a depression may also be felt at the situation of the neck, the existence of the back and head not being continuous as it is at the breech.

The *breech* is a larger, softer, more irregular, less movable tumor, its resistance being continuous with that of the back. Its rebound is always much slower and less vivid than that of the head, it never giving the sensation of ballottement. Moreover, it is often accompanied by the small parts, knees or feet.

The *back*, being the continuation of the breech, is detected, in dorso-anterior positions, by the uninterrupted, regular resistance offered to the palpating fingers. "The sensation perceived is not always the same; generally the back of the fœtus is exactly applied against the uterine wall and this against the abdominal wall, in which case the plane of resistance seems quite superficial; at other times there exists between the back and uterine wall a certain quantity of liquor amnii, the resisting plane being then deeper, the fingers having to displace the intervening fluid."[1]

When the back is posterior, we cannot distinguish it so easily; the plane of resistance is narrower and situated laterally; the small parts are more easily felt. Often, to find the area of resistance offered by the back or side of the child, we must palpate opposite portions of the abdominal wall at the same time, so that we may differentiate the sensation of fœtal resistance from that of the elastic liquor amnii. This manœuvre is also necessary to determine plural fœtation or the presence of myomata.

The *arms* are not usually palpable, being small and kept flexed upon the thorax.

The *feet* and *legs* are recognized as very movable, often sharply projecting, small, irregular bodies, which are easily pushed about, and frequently retaliate by striking sharp taps against the examining hand.

4.—*Determination of the Presenting Part and Position.*

To properly examine the cavity of the pelvis at the superior strait, the hands should be placed with the ulnar edge downward on each of the inguinal regions, just above Poupart's ligaments, and the finger tips pressed downward and toward the median line. When this is properly done, one

[1] Pinard, *loc cit.*, p. 20.

of two sensations will be perceived—either the fingers come in contact with a hard, round body, which fills the pelvic cavity—the head—or only the resistance of the maternal soft parts is felt, the excavation being empty. No other conditions can be found until after labor has begun, for no other fœtal part than the head, vertex presenting, ever descends into the pelvic cavity until forced down by strong uterine contractions; further, the vertex once engaged never becomes displaced, the position sometimes changing, but the presentation never. Supposing the vertex to have descended well into the pelvic cavity, we can, by careful palpation, always show that the head is more accessible and more prominent on one side than on the other, the fingers of one hand being arrested sooner than those of its opposite, which sink more deeply and more toward the middle line, this being well shown in Figure 165. When the engagement is less pronounced, and the head less perfectly flexed, the difference between the sides is still perceptible. The brow is always that part of the cephalic sphere which is the more accessible,

FIG. 164.

Position of the Hands at the beginning of the Examination of the Pelvic Excavation (*After Pinard.*)

prominent and elevated; it also seems harder than the occiput, which, of course, is that which we feel upon the opposite side. The determination of this single point establishes the diagnosis of the presentation and position, which we can corroborate by determining the situation of the breech and back.

Thus, in a presentation of the vertex, with the cephalic tumor more prominent to the right and the resistance of the back felt to the left, the position is left, and *vice versa*.

When we do not find the vertex engaged in the cavity of the pelvis, we find either a breech or head just above the plane of the superior strait, or in one of the iliac fossæ; Pinard, in all the large number of women which he has examined, only having found two instances where both fœtal extremities corresponded with the maternal flanks. Both extremities being found

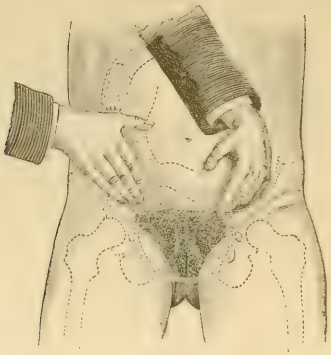
generally easily, for one always lies at the opposite end of the diameter, passing through the other, we should determine whether the head is above or below, the differential points between head and breech having been given above. The discovery of the back, then, completes the diagnosis of the position.

In presentations of the face, with the back anterior, a hard, round tumor is felt above the brim, a little to one side, and the resistance of the back felt deeply on the same side, a marked depression being found between the head and back; with the back posterior, we also find the accessible portion of the head and the resistance upon the same side. Palpation in these conditions is often not as satisfactory as examination per vaginam.

5.—Determination of the Life or Death of the Fœtus.

The spontaneous movements of the fœtus are easily detected by the examining hand, and serve to indicate the undoubted presence and life of

Fig. 165.



The Hands Exploring the Excavation—the right hand arrested by the brow on the right side (*After Pinard*.)

the child. They are rarely felt or observed before the twentieth week, and are of two kinds; a slow, rolling, gliding motion, proceeding from the whole child, and quick, sharp taps which result from the action of its upper or lower extremities.

If the child is strong and healthy, its motions will generally be quick and active, provided the amount of liquor amnii permits sufficient freedom; if the amniotic fluid is excessive in quantity, the fœtal movements will be rapid, but weak and flighty, the size of the fœtus and the amount of liquor amnii being, as a rule, in inverse proportion.

The voluntary motions of the child are not always felt, because, in some cases, the uterus encloses its contents too firmly, and there is too little fluid

present, in others, the fœtus is weak, sickly and incapable of active existence; some mothers, however, never feel quickening during their whole pregnancy, and still the children are born strong and healthy.

The spontaneous movements of the fœtus are frequently excited or increased by the irritation of the examination, and especially by the application of a cold hand to the abdomen, not in consequence of the direct transmission of the cold itself to the fœtus, but through reflex action from the abdominal integument to the abdominal muscles, which contract and press on the uterus, which, in its turn, contracts and thereby incommodes the fœtus, causing it to protest with hands and feet against the disturbance and to rapidly change its position. I have witnessed this phenomena hundreds of times, where students, forgetting the rule to warm their hands before examining, proceeded to palpate the abdomen, producing thus, not only slight shock to the mother, but also contractions of the uterus, thereby interfering with the examination.

The *death of the fœtus* is not recognizable with certainty, but may be strongly suspected if the palpating hand discovers an unusual flabbiness and compressibility of the abdomen in contrast to its former firm and elastic feel, if the motions of the child are not distinguishable, if its body remain passively in any spot to which it is pushed, and thus gives the impression of an inanimate body, if its head feel unusually soft and flaccid (not reliable), and lastly, if, with all these signs, the fœtal heart sounds are inaudible.

6.—*Determination of the Approximate Size of the Fœtal Head.*

In cases where the parturient canal is more or less contracted by deformity of the bony pelvis, disease of the cervix (carcinoma), uterine tumors (fibroids), or where there is habitual excessive development of the child at term, it is of great importance to have at least a fair idea of the size and compressibility of the fœtal head, and this can be gained by careful and practiced palpation, together with vaginal exploration and a comparison of the general dimensions of the child.

Ahlfeld[1] and Sutugin[2] have shown that the length of the uterine axis of the fœtus is equal to about half the length of its whole body, and that its actual length can be easily and pretty accurately obtained by doubling the length of the body of the uterus; ascertained by placing one pole of a Baudelocque's pelvimeter against the presenting part of the uterus in the vagina, and the other against the fundus; in transverse positions, the branches of the pelvimeter are placed transversely against the breech and head of the fœtus in utero.

Ahlfeld found, in 250 cases, that the child in the 36th week averaged 48.3 cm. in length, and weighed (computed by analogy) about 2.896 gms.; in the 37th week, 48.3 cm. and 2.878 gms.; in the 38th week, 49.9 cm. and 3.016 gms.; in the 39th week, 50.6 cm. and 3.321 gm.; in the 40th week,

[1] *Arch. für Gynäkologie*, Band II, Heft 1, S. [illegible]

[2] [illegible]

50.5 cm. and 3.168 gm. By these means and by careful palpation, we can reach an *approximate* idea of the size of the fœtus; more than this, it is almost impossible to obtain.

7.—*Determination of Plural Pregnancy.*

The diagnosis of the presence of twins can be made with absolute certainty only when two identical parts are found to be present, *i. e.*, when a second head or breech is felt. Occasionally it is possible to define the bodies of the two fœtuses more or less clearly by palpation, and at times the great mobility of the parts palpable through the abdominal walls, when the presenting part is felt to be fixed in the pelvic cavity, may lead us to suspect and detect the presence of twins. In general, the size and shape of the abdomen, the longitudinal furrow in the median line, the seeming multiplicity of small members, the exceeding active, ubiquitous motions of the child, the sensations of the mother, the localized œdema over the pubis, spoken of by Pinard, even the hearing of the fœtal heart sounds at different parts of the abdomen, are all uncertain and treacherous signs, compared with the detection of two identical parts.

Pinard[1] lays especial value on *the permanent tension of the uterine wall* perceived on palpation. The sensation, difficult to accurately describe, is readily appreciated by one accustomed to this method of examination. "Instead of depressing the uterine wall with facility, one perceives that this wall is tense and resisting, the sensation being analogous to that perceived by depressing the wall of a rubber bag distended with fluid or air. It is not that soft, doughy sensation, which is perceived upon depressing the relaxed uterine wall when the organ is normally filled; neither is it that hard sensation, almost ligneous in character, which is felt upon depressing the uterine wall during a contraction; it is a sensation similar to that perceived upon depressing the wall of a distended cyst. I lay stress upon the point that this permanent tension of the uterine wall is met with in two classes of cases only, viz.: multiple pregnancy and hydramnios."

Of the numerous cases of twins which I have seen, either under my own care or in various hospitals, only a small minority have been detected before the birth of the first child, in spite of the customary external and internal examinations. That the recognition of three or more fœtuses in utero is possible only under exceptional and favorable circumstances is evident, the only case reported, so far as I am aware, where the diagnosis of triplets was made by palpation, being that recorded by Pinard.[2]

8.—*Determination of Abnormal Conditions.*

Hydrocephalus may occasionally be diagnosticated by palpation, if the head is found to be unusually large, comparatively soft, and even faintly fluctuating, and if, in a normal pelvis, it remains above the brim in spite of energetic uterine contractions.

[1] *Loc. cit.* page 46. [2] *Loc. cit.* page 49.

I have diagnosed the presence of a *hydatiform mole*, chiefly by the enormous development of the uterine cavity disproportionate to the supposed period of pregnancy, the entire absence of all solid parts or resistance usually shown by the presence of a fœtus, the uterus seeming to contain only a jelly-like mass, with a semi-doughy elasticity.[1] Pinard[2] has made a similar observation, and states that he did not find the rounded elevations, or the superficial or deep furrows mentioned by various authors.

Abdominal tumors, fibroids, cysts, etc., are usually accessible only to palpation, and may be recognized by the irregularity which they impart to the general outline of the uterus or abdomen. The flaccidity of the abdominal parietes after delivery will frequently permit the palpating hand to detect abnormalities and tumors of which no previous suspicion was entertained.

In rupture of the uterus palpation gives us the most positive information. If the laceration is extensive the child usually escapes into the abdominal cavity, either partly or wholly, the uterus contracts and occupies the side of the abdominal cavity opposite that containing the fœtus, which is then felt with much greater distinctness than when still in the uterus, its body and limbs in these subjects appearing as though covered only by the skin. "When the fœtus does not thus escape, the fundus uteri commonly falls to the opposite side to that in which the rupture has taken place, owing to the local paralysis of the latter."[3] Later the uterus becomes more relaxed, and blood and liquor amnii may collect in and distend the dependent portions of the peritoneal cavity. Hecker says that these blood tumors may appear in the hypogastric or inguinal region, or in the vagina.

Tully[4] and Parry[5] have each reported a case where a gelatinous fluctuating tumor, found on autopsy to be a subperitoneal hæmatoma, appeared just above the pubes, its significance not being recognized until the necropsy, when the uterine rupture was found. The importance of this symptom, as indicating the occurrence of a possibly, as yet, slight uterine perforation, is obvious, and its proper appreciation may enable us to diminish the mortality from this accident.

A uterus arcuatus, in moderate degree, produces, during the contractions of the organ, a slight concavity of the fundus, with a corresponding prominence of the cornua. Knowing the various forms of dystocia which are liable to happen in exaggerated forms of this deformity, the detection of its presence is not without practical value.

C.—Percussion.

Through this we can ascertain the degree of distention of the bladder, which certainly is of importance, both during examination and labor, as well as in the puerperal state, and is a prominent symptom; indeed, the only external one, in retroversion or flexion of the gravid uterus; as, also, the presence of fæces in the colon. Should the thickness of the abdominal walls or their rigidity prevent successful palpation, we can detect the boundary

[1] *Amer. Jour. of Obst.*, Vol. v, 1874, page 175.
[2] *Loc. cit.* page 7.
[3] Chadwick, *Boston Med. and Surg. Jour.*, Aug., 1877.
[4] *Lancet*, Jan. 1, 1853.
[5] *Amer. Jour. of Obst.*, Aug., 1873.

of the uterus and the height of the fundus through percussion, a knowledge which can occasionally be acquired as early as the fourth month of pregnancy, especially with an empty bladder and an anteverted uterus. In these respects, percussion is not to be undervalued, otherwise it is of but little practical value.

While it is hardly possible to explain every minute technicality of external examination, the above description is sufficiently explicit to enable any one, with practice and a little care, to examine a pregnant woman by this method, with a fair prospect of making an accurate diagnosis. One point must be remembered, and that is, that no force need be employed in any part of the examination, and that the woman should be subjected to no real discomfort or pain; indeed, forcible or rough manipulation will, in itself, frustrate the object of the procedure by exciting reflex contractions of the abdominal and uterine muscles, and thus withdrawing the fœtus from the touch of the examiner.

It has been said that patients in the higher walks of life will not submit to this method of examination, on the ground of its being an improper and unnecessary exposure of the person; but I do not think that any woman who has sufficient confidence in a physician to entrust to him her life during confinement, will object to his palpating and auscultating her abdomen after submitting to a vaginal examination, when she is told that the one method of examination is as necessary as the other, for the safety of herself and child during the coming ordeal. I have never had a patient refuse when the necessity and value of the examination had been explained to her. I think, further, that, if our patients were once initiated into the benefits of this practice, and the very slight inconvenience occasioned them by it, and if our physicians would make it a rule to insist upon it in every case, it would soon become a universal custom, as much desired by patient as by physician. How many mal-presentations could thus be detected and corrected, how many dangers averted, how many women forewarned! Scarcely one of us but has met with obstetric cases in which a previous examination, before labor, would have enabled him to remedy a difficulty or prepare for an unforeseen accident.

II.—TREATMENT.

The various purposes for which external manipulations are employed in the treatment of obstetric cases are: The rectification of an existing malposition, or the conversion of one presentation into another more desirable—external version; the expression of the fœtus; the expression of the placenta. These manipulations differ chiefly from those employed for a diagnostic object, in being useful or practicable only during the various stages of labor. To convert a transverse into a longitudinal position several months or weeks before labor is possible, but useless, because of the great mobility of the child, the probability of a spontaneous return of the abnormal position, and the chance the child has of spontaneously assuming a normal presentation.

A.—Version.

External version is, essentially, an operation advisable and beneficial only just before or during the first stage of labor, before the discharge of the liquor amnii. To insure its easy performance the utero-abdominal walls should be lax, the fœtal position readily palpable, the liquor amnii present, and the fœtus easily movable. Still the operation has occasionally succeeded after the rupture of the membranes, and should always be attempted when the uterine walls are lax. The size of the child will materially influence the practicability of this manœuvre, which, of course, will more easily succeed with a small than a large child. But the child must be living and possess the requisite amount of elastic resistance; if dead, it is easier to turn a large than a small child.

The paramount advantage of version by external manipulation is the avoidance of the always more or less hazardous passage of the whole hand into the uterus, thus avoiding the possible injury to the endometrium, or the introduction of septic matter into the uterine cavity. Another, scarcely less important, is the conversion of the malposition into a *vertex* presentation, internal version being generally necessarily podalic; thus not only the safety of the mother, but that of the child also, is increased by external version.

As by internal manipulation, so may the position be changed by external version to a head or breech.

Indications.—Whenever, during the last month of gestation, or during labor, before the rupture of the membranes and fixation of the presenting part, examination reveals a transverse position of the fœtus, the attempt should be made to convert it into one of the head by external manipulation. Should palpation show that, even after the discharge of the liquor amnii, the child is but loosely grasped by the uterine walls, a like endeavor should be made. The trial can do no possible damage if carefully employed, and may succeed even hours after the evacuation of the waters. During gestation the measure will usually be futile, the fœtus often resuming its abnormal position; in that case it should be repeated and particular directions left by the physician that he be sent for at the first sign of labor.

Following in the lead of Mattei and Hegar, Pinard has recommended the conversion of every breech into a head presentation, by external version. Although this view is not shared by the majority of writers, it is, in my opinion, unquestionably good practice to endeavor to avoid the anxiety to mother and physician, and the danger to the child, always accompanying a presentation of the inferior extremity whenever the presentation is discovered so early in labor that its conversion into a cephalic presentation is practicable. That it is likely to be rather more difficult than in a transverse position, should not deter us from making the attempt. Those cases in which the head, in transverse positions, shows a spontaneous tendency to glide toward the pelvic brim; oblique positions; or where the presenting breech rests on the

ilio-pectineal line; or the feet present instead of the breech; or where there is an abundance of liquor amnii, will prove specially favorable for external version, as is also the case with a second twin child. Cases of moderately contracted pelvis form an exception to the rule of cephalic version. In these cases it is generally safer to turn by the breech or feet, as it has been shown that an after-coming head, being shaped like a wedge, will usually pass through a narrow pelvis more readily than the broad vertex of a presenting head.

Contra-Indications.—The only actual contra-indication to the *attempt* of external version is the necessity for a rapid termination of the labor, or the presence of twins in utero. In this latter case, there would be danger that the pressure would rupture the membranes if the sacs were distended, or alter the relation of the fœtal annexes, particularly of the umbilical cords. Tenderness, thickness, or tension of the abdominal walls, the small amount of the liquor amnii, fixation of the presenting part, unusual size or death of the child, are not properly contra-indications to the *attempt*, but rather obstacles to the *success* of the operation, which *may* occasionally be overcome.

Operation.—An accurate knowledge of the exact position of the child is absolutely indispensable to the rational performance of external version. This knowledge can only be acquired by palpation and auscultation, as before described. As already stated, the operation may be performed at any time during the last month of pregnancy, and during labor, so long as the child is not too firmly grasped by the uterine walls, but the time of election for the operation is during the first stage of labor, before the membranes have ruptured, and when the os uteri is approaching complete dilatation.

The position of the child having been ascertained, version is performed as follows: The woman is placed in the position employed for palpation (see p. 1099), with empty bladder and rectum, the physician standing at her side, preferably that toward which the breech is turned, and placing one open hand on the abdomen over the head of the child, the other over the breech, grasps them gently but firmly, and endeavors, by a sliding, pushing motion, to direct them toward the desired point, the head downward the breech upward. In doing so, he will usually be obliged to press deeply into the abdomino-uterine wall, and, as it were, push it in the desired direction. Thus, with the head to the left, the operator stands on the right side of the patient, places his right hand over the head of the fœtus his left over the breech, and while he pushes the breech up toward the fundus, presses the head down into the pelvic brim.

If labor have already commenced, of course this is done only between the pains, during which the hands hold the two fœtal antipodes firmly fixed in whatever position they may have been placed. The pains themselves, by

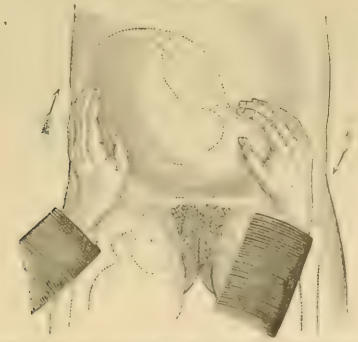
contracting the uterine walls around the child, aid in correcting and fixing the position, when once rectification has begun.

These manipulations must be continued until either the purpose is obtained, or its impossibility demonstrated. Occasionally an attempt made at one period fails, and after an interval succeeds, or failing at first we may be successful where the patient has been anæsthetized to the point of muscular relaxation.

To render fœtal evolution possible when one extremity has engaged in the pelvic brim, we have to raise it from the cavity by pushing up the inferior uterine segment, either with a hand above the pubes or with a finger or fingers introduced into the vagina, and displacing it toward one of the sides of the pelvis; after this we proceed as before directed.

Podalic version by external manipulation is indicated only in cases where the child is very movable, and the os but very slightly dilated; such cases are,

FIG. 166.



Position of the hands, and direction of the pressure in external version when the position is oblique. (*After Pinard.*)

particularly, the early stages of placenta prævia, when it may be desirable or imperative to use the thighs and breech of the child as a hæmostatic wedge.

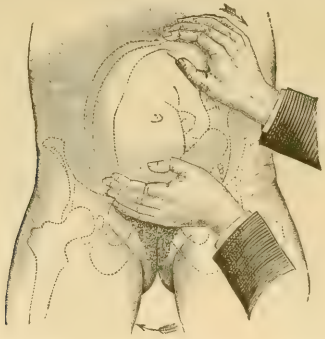
When the rectification of the position has been confirmed by a vaginal examination (during which the head is firmly held down by the hand of an assistant), and the head is felt in the pelvic brim, the woman is directed to lie on the side where the head formerly was, and a firm pillow may be applied over the ilio-lumbar region of that side, to prevent the head from again slipping into the iliac fossa. Pinard recommends a peculiarly-padded abdominal bandage for this purpose, he rectifying the position as early as the eighth month, and at once applying this "ceinture," which is allowed to remain until the head is fixed, the pressure by it being gradually increased. It causes no inconvenience, and is said to be efficient.

I certainly have found cushions and pillows ineffectual, unless the proper

lateral decubitus was employed at the same time, and even then the head has often required to be pushed down repeatedly and held before its fixation could be assured. Ellinger doubtless gives the most effectual mode of keeping the head down, when he insists on its being held by the hand of an assistant until the uterine contractions force it into the pelvic brim, or the membranes rupture, or the os is sufficiently dilated to allow of their being ruptured; such an assistant can be found in any intelligent person, all that is required being to exert steady downward pressure over the hypogastric region.

When the os is sufficiently dilated, that is at least one-half, the best means of fixing the head permanently is to rupture the membranes. Until the head has become firmly engaged in the pelvic cavity, the woman should occupy the lateral decubitus on the side where the head formerly was. Occasionally, in cases of extreme mobility of the fœtus, and in oblique positions, the same lateral decubitus may succeed alone in restoring the longitudinal position of

Fig. 167.



Position of the hands, and direction of the pressure in external version when the position is longitudinal. (*After Pinard.*)

the child. To avoid possible prolapse of the funis, the membranes should be ruptured during the interval between the pains, the head being fixed by exciting uterine contractions by circular friction of the fundus combined with steady downward pressure.

Schatz's method of converting a face into a vertex presentation is already briefly described on page 347. It should be undertaken before the rupture of the membranes, while the face is still at the brim. To be successful, the operator must be proficient in external obstetric examination, and be able to diagnose easily and positively the exact position of the child. One great advantage of the method is, that if it fails, it can at least do no damage.

B.—Fœtal Expression.

From time immemorial, friction of the abdominal parietes during tedious labor has been employed as a stimulant to the regular uterine contractions,

and has proved itself a safe and efficient auxiliary, more prompt than medicinal oxytocics, and more effective than the hot bath, cold sponging, or active motion. It is a practice familiar to every nurse or midwife, and probably made use of to a greater or less degree in the majority of labors. By exciting or increasing uterine contractions, the normal expulsive force of the uterus is increased, and abdominal friction, therefore, must be considered merely as an oxytocic, a promoter of the natural expulsive power of the uterus. *Expression* of a whole or part of the fœtus is, however, a totally different thing. Employed by the obstetricians of the middle ages, it had fallen into oblivion until Von Ritgen,[1] of Giessen, in 1856, recalled it to the profession. It was not employed, however, until 1867, when Kristeller, of Berlin,[2] in a thorough and explicit paper, reported a series of cases in which, by systematic rhythmical pressure on the fundus uteri, he had succeeded in effecting the delivery of the child. Since this time it has been recommended and adopted by many eminent authorities,[3] among whom are Ploss, Abegg, Playfair, Schroeder, Barnes, Spiegelberg, and Bidder.

The most important *indications* for the use of the method are: to reinforce weak or deficient uterine contractions; to aid in the expulsion of the aftercoming head; to aid the delivery of the head in forceps cases. Other indications have been given by its authors, who have endeavored to extend its use to cases where its success would be a rare exception.

1. *To Reinforce Weak or Deficient Labor Pains.*

Indispensable conditions to the success of expression are: a vertical position of the child; the absence of any inflammatory affection or unusual tenderness of the abdomen; a normally shaped pelvic canal; a well dilated os uteri, a ruptured bag of waters, and, finally, a low position of the presenting part. Partial dilatation of the os and the persistence of the membranes will not absolutely contra-indicate the operation, though, to be effectual in such cases, it would have to be continued so long as to become exceedingly painful to the patient, and exhausting to the operator.

That steady pressure on the fundus uteri will, when the os is thoroughly dilated, advance the presenting part towards the floor and outlet of the pelvis, can readily be demonstrated in any suitable case; to be sure, the presenting part recedes when the pressure ceases, but with each succeeding pressure the advance will be slightly greater, until, everything being favorable, the vulva is distended and the part expelled.

The cases particularly suitable to Kristeller's method are those so frequently met with in primiparæ, in which the presenting part rests on the floor of the pelvis, or even presses against the perinæum, and for want of efficient pains, does not advance, or advances but to recede again, until, after several hours of delay, exhaustion demands relief.

In breech presentations, I believe the method to be vastly more valuable

[1] "Ueber das Entbinden durch Druck etc." *Monatsschr. f. Geburtsk.*, [illegible]

[2] *Berl. Klin. Wochenschr.*, No. [illegible], and *Monatsschr. f. Geburtsk.*, [illegible]

[3] See, for instance, *Obstet.*, 1880, p. [illegible]

than in head labors, and I refer particularly to cases in which the breech becomes impacted in the pelvis in such a manner that extraction by fingers or instruments is a matter of impossibility or great difficulty. Here the forceps have been applied successfully, but their introduction is frequently hazardous, and their grasp often an insecure one. If, now, by expression, we can succeed in reaching the flexure of the thigh, the extraction becomes like an ordinary one.

I am disposed to agree substantially with the rule laid down by Abegg, that "whenever there is delay in the expulsion of the head, Kristeller's expression should be tried before applying the forceps." Should it fail, it will at all events, serve to push the head deeper and fix it more firmly in the pelvic cavity, and thus facilitate its extraction with forceps.

Operation.—"The patient being in the dorsal position, the operator maps out the uterus and moves it into the axis of the pelvic brim, if it should have deviated to one or the other side. He then grasps the uterus with both hands on the same plane, with their ulnar borders directed toward the pelvis, the palm pressing on the fundus or the sides near by, the thumb pointing toward the median line, and the fingers striving to encompass the uterus as much as possible. First the abdominal walls are gently rubbed against the uterus, and then, the hands retaining their position, slight, gradually increasing, downward pressure is made, which is kept for a time at its acme, and then gradually diminished. The pressure should last five to eight seconds, and be repeated at intervals of from one-half to three minutes, according to the stage of labor and the sensitiveness of the patient. The points of pressure should be changed, alternating between the fundus and one of the horns of the uterus. The less the os is dilated, the more should lateral compression be made; the more dilated and the softer the os, the more is the compression indicated, and the more effectual will it be."[1]

The simplicity of the operation is apparent. The necessary conditions are really, strength on the part of the physician, endurance on the part of the woman, and patience on the part of both.

2. *As an Aid in the Delivery of the After-coming Head.*

The expression of the head during its delivery by manual traction on the body, has been in use since the introduction of podalic version and extraction. It was recommended by Celsus at the time of Augustus, and after the revival of obstetric medicine from the coma of the middle ages, by Paré, and in our own time, by nearly all writers on obstetrics. It is a measure of the greatest utility and importance, and may enable us both to avoid the forceps (always a difficult, and often an unsuccessful operation in the haste of the moment), and save the life of the child at the critical period, when its cord is being compressed between the impacted head and the pelvic brim. Especially is it of value when there are no uterine contractions whatever,

[1] Kristeller: *Berl. Klin. Wochenschr.*, No. 6, 1867.

and particularly where there is a disproportion of minor degree between the head and pelvic canal, the compression being used always in connection with traction made on the body of the child in the usual manner. Dr. Goodell[1] gives us the result of his experience, by saying that "by the conjoint use of two very nearly equal forces, viz., that of supra-pubic pressure by the hands of an assistant, and that of traction on the body of the child by the physician, there can be safely brought to bear upon the hind-coming head an extractive force fully as great as that by the forceps on the fore-coming head."

The immense value of expression is shown by this statement of so reliable and exact an observer as Dr. Goodell; another advantage, also mentioned by him, is the possibility of directing the head so that its largest diameter enters into the largest part of the contracted pelvis, that is, the broad occipital into the lateral portion of the pelvis, and the small bi-temporal diameter into the narrow conjugate.

This supra-pubic pressure may be exerted with considerable force; but there is a limit to this, for, aside from a possible injury to the soft parts of the mother, the child's head may be so firmly compressed against the pelvic brim as to cause contusion and fracture of the skull and intercranial effusion. I have a recollection of seeing a case reported of fracture of the skull produced in this manner, and also one of intermeningeal apoplexy occurring in a labor with a pelvis contracted to three inches in the conj. vera.[2]

The mode of pressure in expression of the after-coming head differs from that used in head-first presentations, or in expression of the body, in that firm, steady, downward and backward pressure is made without intermission, on the fundus and head, over the pubes, both hands being placed close together over the fundus, until the face glides over the perineum. In case it is desired to press one portion of the head into a certain part of the pelvis, the direction of the pressure may require slight modification.

3. *To aid the Delivery of the Head in Forceps Cases.*

It is an established rule in forceps extractions to make traction only during the pains, if, indeed, there be any present. The reason for this is obvious, viz., to secure the *vis a tergo* of the uterine contraction as an aid to the *vis a fronte* of the forceps. Precisely what is done by the contractions it is designed to do by methodical pressure on the fundus uteri, when they are absent or deficient, and it is advisable to exercise this pressure even when the pains are active. A most efficient method for preserving the perineum in primiparæ, to be recommended in all such forceps cases where a delay of ten or fifteen minutes in delivery is not contra-indicated, is to remove the forceps as soon as the occiput protrudes under the pubic arch, apply expression until the chin can be reached by the fingers in the rectum, and then gently and gradually aid the

[1] *Am. Journ. of Obstet.*, vol. [illegible] 1871, page [illegible].

[2] [illegible] *Med. Recorder*, Aug. 20th, 1874.

extension of the head until the face slips over the fourchette. This manœuvre may occupy fifteen minutes or longer, and beginners are particularly cautioned not to hasten the process, and to exert only the very gentlest traction on the chin with the intra-rectal fingers, while supporting and even repelling the occiput with the other hand, until the perineum is thoroughly distended.

After what has been said in the previous section, it is evident that suprapubic pressure in the rare cases of forceps extraction of an after-coming head is of even greater importance than in the case of the presenting head, the compression, of course, being simultaneous with the traction.

IV.

ANÆSTHETICS.

The general uses, indications and contra-indications, etc., for anæsthesia[1] having been already discussed in so far as the two agents—chloroform and ether—most generally used are concerned, it is only necessary here to speak of those which have been employed more recently in obstetric practice. Of these, the most important are ethylic bromide, methylene bichloride, nitrogen monoxide, and various combinations of two or more anæsthetic substances.

Ethylic Bromide (C_2H_5Br), discovered in 1827 by Serullas, is a limpid, exceedingly volatile, neutral liquid, having a strong, not unpleasant ethereal odor, a disagreeable, sweetish taste, boiling at 105.25° F., not easily inflammable, sparingly soluble in water, but miscible in all proportions with ether or alcohol.

It is not a thoroughly stable compound, and unless great care is observed in its preparation, or if it is not freshly made, is apt to be contaminated with dangerous impurities[2] (C_2Br_4 and Br), which may impart to it a slight brown coloration and a certain pungency of odor, together with a greatly increased liability to the production of dangerous toxic effects. It is, therefore, necessary to use a product which is fresh and which, in addition to the usual means of rectification with water, potash, and calcium chloride, has been treated with five per cent. of olive oil, shaken occasionally for twenty-four hours and then distilled over a water-bath at a temperature below 104° F., the distillate being pure ethyl bromide.[3] It was, I believe, first used as an anæsthetic on man by Turnbull, of Philadelphia (1878), and soon after by Levis of the same city.

It is an exceedingly pleasant anæsthetic, producing entire muscular relaxation in two or three minutes, when given freely at first, as it should be, on

[1] See page 915, *et seq.*

[2] Junck, *Med. Record*, July 11th, 1880, p. 84.

[3] *Le Prog. Med.*, Aug. 28th, 1880.

account of its great volatility, and generally with very few disagreeable symptoms.

The pulse and respiration are at first slightly stimulated, but when the anæsthesia is complete, depressed. The face and neck are often flushed, there is apt to be a hypersecretion of mucus in the fauces. Vomiting is not observed as often as after the use of chloroform. The symptoms in general are those observed after the use of most ethereal anæsthetics.

At least two deaths from its use have been reported, in which the drug has killed by its toxic action on the respiratory and cardiac centres, and several cases are known where it has produced symptoms of irritant poisoning, doubtless from its contained impurities.

Lyman[1], in a series of sphygmographic tracings, has shown in an impressive manner the depressing action of the drug on the heart of animals and of man, the pulse curve being less favorable than that of chloroform, and the manner in which death ensues in an animal from an overdose of the drug; in his experiments respiration and the heart's action ceasing simultaneously, these agreeing with the observations made on the human subject in the fatal cases recorded.

Montgomery,[2] of Philadelphia, has strongly advised the use of this agent as an anæsthetic in labor, saying, in a paper giving the results of its use in twenty-nine cases in his own practice, "The ethyl was administered with the advent of each pain, by holding over the face of the patient a napkin on which a few drops had been poured. This was removed as the pain subsided. There was no choking or suffocation, as with chloroform, and entire absence of the stage of excitement. After one inhalation, the patient invariably begged for it with the advent of each recurring pain. With small quantities, the sensation of pain was blunted, while intelligence was uninterrupted; the patient was perfectly subject to control and ready to render or withhold voluntary effort, as desired. Under such treatment, the expulsive efforts resembled those made to evacuate obstinately constipated bowels, and were not attended with more pain. In multiparæ, the usual expression was that they had never known such relief. No diminished power in the uterine contractions was observed subsequent to its use; in fact, in many of the cases where before the contractions had been ineffectual and irregular, they became strong and regular."

Montgomery gives also the conclusions of Lebert, Wiedemann, Haeckermann, Muller, Chisholme, and Prince, in all over seven hundred cases, they agreeing in the main with his conclusions, though Muller notes some unpleasant results which were doubtless caused by impurities in the ethyl.

Booth[3] and Byrd[4] strongly recommend mixtures of ethyl bromide with alcohol and chloroform; the first using alcohol two parts with chloroform and ethyl each one part; the second, ethyl one; chloroform three; alcohol four.

[1] Artificial Anæsthesia and Anæsthetics. N. Y. [illegible], p. 216.

[2] *Am. Journ. of Obst.*, vol. xxvii, [illegible].

[3] [illegible].

[4] [illegible].

While there is no doubt that the drug given as above described is exceedingly efficient, rapid and pleasant in its action, still, after weighing the evidence of both sides, I must agree with Lyman that ethyl bromide must be ranked with chloroform as one of the most potent and dangerous of anæsthetic substances.

In using the drug we must take special care that the specimen be pure and fresh, the bromic impurities with which it is liable to be contaminated being much more dangerous than the impurities which may exist in chloroform, and should give it only to partial anæsthesia; when it becomes necessary to produce complete muscular relaxation ether is much to be preferred.

Methylene Bichloride (CH_2Cl_2). This agent, at present employed very extensively in London, is a colorless, ethereal fluid, its odor much resembling that of chloroform, with which, indeed, unless very carefully prepared, it is apt to be largely contaminated. It is very volatile and inflammable, and its boiling point, 87° F., so low that it cannot conveniently be used in warm weather.

The blood during its administration remains of a bright red color and clots easily, even after its fibrin has been removed. The action of the heart and respiration are at first slightly stimulated, afterward depressed, its action being like that of chloroform. Anæsthesia is produced very rapidly and as rapidly recovered from, from one to two drachms being usually sufficient to induce complete insensibility. Though vomiting occurs quite often, the disagreeable effects observed both during and after the administration of methylene bichloride are usually much less marked than after the use of chloroform. Considering the relative number of cases in which the drug has been used, its rate of mortality[1] is higher than that of chloroform, death being produced, as by this agent, by heart failure.

Though fashionable at present in England, it is not likely that its popularity will stand the test of long experience, as it is difficult to procure pure, is inflammable, does not appear to be as safe as, and possesses no marked advantage over, chloroform. I do not think that it will supplant this drug or that its use is desirable.

Nitrous Oxide (N_2O) is a colorless gas, neutral in reaction, having a faint, sweetish odor and taste, reduced by a pressure of fifty atmospheres at 7°, or thirty at 0° C., to a faintly steel-blue colored, mobile liquid, which resumes the gaseous state when the pressure is removed. It is freely soluble in cold water or in alcohol, less soluble in warm water; is decomposed by a red heat, and though not combustible is, after oxygen, one of the best supporters of combustion known. It is best prepared by gradually heating pure ammonium nitrate to a temperature of 215° C., the gas formed being passed through wash-bottles containing sodium hydrate and ferrous sulphate. It is most conveniently kept condensed and liquefied in strong, portable metallic

[1] Eleven cases of death from the use of this drug have been collected by Lyman. *Loc. cit.*, p. 102.

cylinders, and can be procured thus from the dental supply manufacturers, together with the necessary conducting tubes and rubber gas bag.

When inhaled, diluted with air, it produces the exhilarating effects first observed by Davy in 1799, the anæsthetic effect of the pure gas being first noted by Wells, of Hartford, after whose death, in 1848, it was almost forgotten until Colton, in 1863, began to use it as a dental anæsthetic, and at this date (January, 1886) has administered the gas in over 148,000 cases without a single bad result, though others have not always been so fortunate, more than five deaths having been reported which may be attributed to the lethal action of the gas.

While, without doubt, it is by far the safest anæsthetic for operations requiring only a brief period of unconsciousness, it was long ago shown that in its pure state it soon produced asphyxia, and that when mixed with air its anæsthetic power was much lessened. Joylet and Blanche[1] showed that animals could live in an atmosphere of nitrous oxide and oxygen combined in the same proportions as in ordinary air, and later, Paul Bert demonstrated that anæsthesia with these mixed gases could be produced and indefinitely continued without harm. The following is from a paper read by him before the Academy of Sciences, November 11th, 1878: "The fact that nitrous oxide must be administered in a state of purity, shows that in order to impregnate the organism with a sufficient quantity, under the normal atmospheric tension, the gas must form one hundred per cent. of the air that is breathed. But if we suppose the patient placed in an apparatus where the pressure can be raised to two atmospheres (thus doubling the amount of gas in a given space), the necessary conditions will be secured by respiration of a mixture containing fifty per cent. each of nitrous oxide and common air. Under these conditions there should be manifested anæsthesia, while, as a consequence of the normal quantity of oxygen in the blood, all the natural factors of respiration are maintained." His experiments, first upon animals and later upon the human subject, were perfectly successful, he using the nitrous oxide diluted with fifteen to twenty per cent. of oxygen, and increasing the atmospheric pressure about one-fifth.

Bert's method, though safe and efficient, can never be generally used, as the apparatus required—a special chamber in which patient and operator remain in compressed air—is cumbersome and costly, and later experiments have shown that, at least in obstetric practice, increased pressure is not necessary.

Klikowitsch,[2] in 1880, strongly advocated a mixture of nitrous oxide four parts and air one part, as the ideal obstetric anæsthetic agent.

Winckel[3] has used the gas with success at the Dresden Maternity, employing a simple mouth-piece and not covering the nose.

Doederlein[4] has used a mixture of nitrous oxide and oxygen at the Erlangen Obstetrical Clinic for over a year, with excellent results, the mixture of

[1] *Archives de Physiol.*, 1875, p. 304.

[2] *Centralbl. für Gynäkol.*, No. 10, 1880.

[3] St. Petersb. M. W. Ausgabe, 1884, p. 117, and p. 73.

[4] *Arch. f. Gynäkol.*, Bd. XIX, 1882, p. 1.

the two gases taking place in a large gas holder, from which it is conveyed to the parturient ward in pipes laid along the wall at the height of the beds. It is generally used only in the second stage, and though continuously inhaled for from thirty minutes to an hour, no cumulative effects or threatening symptoms were observed. The sensations during the narcosis, as described by Dœderlein, who had had the mixture repeatedly administered to himself, are not disagreeable. They consist first in a peculiar prickling feeling passing through the body, slight darkening before the eyes, and in a vivid mental activity, standing in marked contrast to the lethargic, somnolent state of the body, but especially in an anæsthesia which, at first incomplete, later becomes complete. In most parturients, ten to fifteen inhalations sufficed to quiet them, without any phase of excitation, and even to cause them to sleep. Usually there is no consciousness remaining, though the patients react to calls, that is to say, promptly answer questions. Restored to consciousness by a few breaths of ordinary air, most of them know nothing of what has happened. It is hardly possible to demonstrate that the narcosis has any effect on the frequency or force of the pains, or in any way retards the labor, the latter sometimes being even hastened by a very energetic bearing down. In operations in which a relaxation of the uterus is desirable the gas is not appropriate, because the pains continue strong. But in normal labors and such manipulations as do not require uterine relaxation this mixture is strongly recommended.

Could the mixture of nitrous oxide and oxygen, with the apparatus necessary for its use, be furnished in a cheap and easily portable form, it would undoubtedly become the favorite anæsthetic of the accoucheur, though until these questions can be satisfactorily answered, its use is, by necessity, practically confined to lying-in asylums and hospitals.

The superior advantages of any of the agents mentioned above over our old friends, chloral, chloroform, and ether, have not yet been conclusively shown, and until this becomes the case, I must still advise chloral for relieving the suffering in the first stage, chloroform for dulling the severity of the pain during the expulsive act, and chloroform or ether for any operation requiring complete anæsthesia.

When chloral has been used during the first stage and beginning of the second, should it become necessary to give any additional anæsthetic, ether is much to be preferred, as it stimulates the heart, and, unless pushed to a surgical degree, the uterine contractions.

V.

ANTISEPSIS IN OBSTETRICS.

When, in 1847, Ignaz Philip Semmelweiss, then an interne in the Vienna Maternity Hospital, formulated, for the first time, the theory that puerperal fever was caused by the absorption of septic matter, and that it could be in a great measure prevented by destroying this morbific material, by the application of a disinfectant solution (*i. e.*, chlorine water or chloride of lime), his idea attracted little attention, and it was not till 1849 that it became more generally known. Rokitansky, Hebra and Skoda received the new doctrine kindly, but most of the authoritative minds of the day ranged themselves on the side of its enemies, and though Semmelweiss defended his theory with a pertinacity amounting almost to fanaticism, it gained little ground, and brought its author but little honor, though much of scorn and hatred.[1] Nevertheless, this idea was the germ from which our modern antiseptic midwifery has developed, though Pasteur had first to demonstrate that the active agent in the virus was a living organism—one of the microbes of decomposition—and Lister to show the results obtained by keeping it and its kindred from wound surfaces.

We need not trace the progress of antisepsis or of antiseptic procedures step by step; few there are now who doubt its value, and none who can gainsay the results obtained through its employment. Though it may be—and has been, in some instances—carried to excess, as later results have proved, properly used, it is a safeguard which none of us can now be without.

While, in the years before antiseptic measures were used, the mortality in even the best Maternities of Europe was enormous—often averaging 15 to 20 per cent. for long periods, and at times being even greater, so that, as is graphically described by Fritsch,[2] "To be laid on the bed of confinement was equal to being delivered to the hangman"—now the death-rate is reduced to less than one per cent. In the vast Maternity Hospital in Vienna, in 1883, the mortality was only one-half of one per cent. In the Prague Maternity[3] the mortality, in 1865, was 9.28 per cent.; in 1869, 11.62 per cent.; in 1871, 3.08 per cent. In 1875 new wards and antiseptic measures at once lowered the death-rate to 2.75 per cent.; in 1882 it was only 0.56 per cent., and in 1883, in Prof. Streng's division, in over eleven hundred confinements, there was no death from septic causes.[4] In 1870 Tarnier introduced the antiseptic system in the Paris Maternité, and events have proved that, with each successive step of advance in the minutiæ of its application, the death-rate has fallen.

[1] Ignaz Philip Semmelweiss. Hirschberg. *Am. Journ. of Obst.*, vol. xvii, p. 245.
[2] Grundriss der Path. u. Therapie des Wochenbetts. 1881, p. 4.
[3] Das Methodische Antisepticum in Obstetric. Paul Bar. Paris, 1883.
[4] The Science and Art of Midwifery. Lusk. New York, 1883, p. 609.

Prior to 1870 the mortality fluctuated from 3.5 per cent. in 1858, 11.7 per cent. in 1861, 13.7 per cent. in 1863, 20.3 per cent. in 1864 to 11.6 per cent. in 1869. In 1871 it fell to 2.8 per cent., and in 1883 had reached 1.1 per cent., and this in the general hospital. In Tarnier's pavilions, where antisepsis is most complete, the showings are still better. In 1876, the year after its establishment, there was one death in 88 deliveries; in 1877-8, two deaths in 438; in 1879, one death out of 182, and in the next 785 cases no death (to June, 1883). Later, these remarkable experiences were repeated in our own country, when Garrigues, in September, 1883—during the prevalence there of an epidemic of puerperal fever, with enormous mortality—introduced into the New York Maternity Hospital the antiseptic system, practically as used by Tarnier, and with the same wonderful results we have noted elsewhere; for in the 162 confinements following there was no death, and in 409 only three, from septic causes.

When we look on results like these we must not forget the man who suffered in their inception and defence, but say, with Schroeder,[1] "When we speak of the benefactors of humanity, let us place among the foremost the name of Ignaz Philip Semmelweiss."

Antiseptic Measures and Substances.

Of these we will only consider those which may be useful to us as obstetricians, giving first a synopsis of the various means and agents by which we can accomplish our end, and then what modern science considers the most effective.

Antisepsis may be accomplished in four ways:—

1. *By removal of the germs or products of decomposition.*

This would include the removal from the lying-in room of all unnecessary furniture, especially that which is old or stuffed, or drapery (and of unnecessary persons); the removal of settled dirt by scrubbing of walls and paint, and of floating particles by as thorough ventilation as possible; by bodily cleanliness of the patient, and by the removal from her of lochial or other discharges at proper intervals.

2. *By destroying them.*

By burning dressings, etc., which have been used in septic cases, and by thorough boiling in a disinfectant solution, of more expensive articles—bedding, etc., which have been exposed to contagion; by destroying, by oxidation, by free exposure to sun and air, noxious principles in mattresses, etc.; by receiving all excretions or discharges in a solution of some metallic salt, notably ferrous sulphate (sat. sol., *ad lib.*) or zinc sulphate (℥iv to cong. j.) or chloride (℥ij to cong. j); by disinfecting all near privies or water-closets, by the application of one of these salts, or lime, or of some absorbent, as dry earth, charcoal or gypsum; and by the thorough fumi-

[1] Schroeder, Lehrbuch der Geburtshülfe. 1884. Achte Auflage, p. 445.

gation, at stated short intervals, of wards, rooms and furniture where women have been confined, or by the immediate fumigation of them when a septic case has occupied them—this fumigation being best accomplished by the use of sulphur dioxide, produced by burning at least three pounds of sulphur to every 1000 cubic feet of space to be disinfected.

3. *By preventing their access.*

By the use of lint, dipped into an antiseptic solution, placed over the exposed parts during labor, and by the use of an impermeable aseptic dressing during the puerperal state.

4. *By rendering them sterile or destroying them when present.*

Of the long list of antiseptics and germicides which have been used at various times for these purposes, we have only to consider *Mercuric Chloride* ($HgCl_2$), *Mercuric Iodide* (HgI_2), *Hydronaphthol* ($C_{10}H_7OH$), *Phenol* or *Carbolic Acid* (C_6H_5OH), *Boric Acid* (H_3BO_3), *Salicylic Acid* (C_6H_4OH, $COOH$), and *Potassic Permanganate* ($KMnO_4$).

The *Mercuric Chloride* (bichloride), the first on the list at the present time, is entirely effective in a watery solution of 1–1000 parts, for all external uses; and in a solution of 1–2 or 3000 parts, at which dilution it is but slightly irritating, and in ordinary cases perfectly safe, for vaginal injections and washings, though for intra-uterine douching a still more dilute solution is safer, as quite a number of severe and even fatal cases of poisoning have resulted from the use of the 1–2000 solution. Stronger solutions than 1–1000 need never be used, and in no case should the very concentrated solutions of 1–75 or 100, in serum or other fluid, which have been advocated in surgical circles, be employed.

The *Mercuric Iodide* (biniodide), destined soon to supersede the chloride, has all of its advantages, with the additional one, that it is nearly three times as potent an antiseptic.

The results of some experiments made by Miquel, and published in *L'Annuaire Météorologique de Montsouris*, to determine the minimum amount of an antiseptic necessary to prevent fermentation in a litre of sterilized beef broth, show that bacterial life is impossible in a solution of one-forty thousandth part of the iodide, while of the chloride it requires the one-fourteen thousandth part to produce the same effect.

Experience in the use of antiseptics has shown that, in practice, they always require to be used of a strength several times greater than the minimum necessary to suppress bacterial life in experiments with sterilized solutions. On the human organism, the toxic effects of the iodide are nearly similar to those of the chloride when given in equal doses, and as we can use the iodide with equal effect as a germicide in a solution of only one-third or one-half the strength found necessary in the chloride, we surely will not run so great a risk of producing unpleasant symptoms from its use.

Dr. Bernardy[1] has recently called the attention of the profession to the

[1] *Am. Jour. of Obst.*, vol. xxvii, p. 1093.

advantages of mercuric iodide, and has reported the results in three cases, where it was used in a strength of 1–4000, in all of which it was exceedingly prompt in its action, being especially so in a septic case with very fetid discharges, where the chloride, of a strength of 1–2000, had failed. Of course, positive deductions as to its value can only be drawn from the results of its use in a large number of cases. Dr. Bernardy, in detailing his experience, says: "I have found the 1–4000 solution of the biniodide non-irritating. I have used it extensively in my gynæcological practice, and in washing out pus cavities, with good results. In it we have a preparation where the smallest amount of drug is used, with results far exceeding those of any other antiseptic. On account of the small quantity of mercury, there will be less chance of salivation." The method of making the solution is, to take three and a half grains of the salt, well triturated in a mortar, and rubbed with one quart of boiling water, slowly added, this giving a strength of 1 in 4390. It is very probable that a strength of 1 in 6 or 8000 will be found sufficient for reliable antisepsis. In the article just quoted, there is also the testimony of Panaz,[1] ophthalmic surgeon to the Hôtel Dieu, who shows that the iodide is as good an antiseptic as the bichloride, though used in a much smaller proportion, he saying: "I have convinced myself, after a number of experiments, that a solution in water, 1–10,000 of the bichloride, or a similar solution of 1–225,000 of the biniodide of mercury, is much superior to any other antiseptic solution employed in eye surgery."

Hydronaphthol ($C_{20}H_7O$, OH), a recently discovered derivative of naphthaline, was first introduced into surgical antisepsis by Dr. Geo. R. Fowler, of Brooklyn,[2] who considers it by far the most promising of the phenol series. It is a solid, not volatile at ordinary temperatures, but beginning to sublime at 93° C.; is freely soluble in alcohol, ether, chloroform, glycerine, benzole, and fixed oils; in hot water, in the proportion of 1 to 100, leaving a tarry residue (alpha-naphthol) which, however, does no harm. When cool the excess crystallizes out, leaving a solution of about 1 to 1000; cold water dissolves about 1 part in 2000, by agitation. Dr. Fowler has found it to be "non-irritant, non-corrosive, and non-poisonous," and though only soluble in water in the proportion of 1 part to 1000, in this proportion it is perfectly antiseptic. It has no odor, to disguise that of putrefaction, nor is it decomposed or rendered inert by the products of putrefactive decomposition. It will not injure, in any form, colors or textile fabrics. It is easily powdered, and may be triturated and used mixed with any inert powder, in the proportion of 2 to 4 per cent.

Experiments to prove its germ-sterilizing power demonstrated that as an antiseptic it is one-fifth as powerful as mercuric chloride, twelve times as efficient as phenol, thirty times as potent as salicylic acid, sixty times as sodium biborate, and six hundred as alcohol.

In making solutions of the hydronaphthol it is Dr. Fowler's custom to place a sufficient quantity in a teacupful of hot water to produce a milky

[1] *Phila. Med. Times*, May 16th, 1885. [2] *New York Med. Journ.*, Oct. 3d, 1885, *et. seq.*

mixture, then water at the ordinary temperature is added until the solution becomes clear. In hospital irrigating jars the hydronaphthol may be placed in excess and warm water added and replenished from time to time, as the solution is drawn off. In private practice it is convenient to have powders made up of 7½ gr. each, which can be added to a pint of warm water when needed.

I should advise this as a good antiseptic for normal puerperal cases. Where it is necessary, in septic cases, to use intra-vaginal or intra-uterine injections, a solution of a mercuric salt should be used first, to destroy the morbific organisms,[1] which may be followed by the hydronaphthol, to remove any of the first solution which may have been retained, and thus lessen the danger of mercurial poisoning.

Phenol or *Carbolic Acid* is fairly effectual in a one or two per cent. solution, but is not as reliable as the mercurials, and is objectionable on account of its odor, which often but masks that of putrefaction, and the disagreeable numbing effects which it produces in the hands of the operator. Strong solutions (saturated 5 per cent.) are corrosive, and apt to produce well-known poisonous effects.

Boric or *Salicylic Acids*, in saturated solution, are good disinfectants, either for general use or for instruments, the first being especially used in cleansing the eyes of the new-born.

Potassic Permanganate, used of a strength just sufficient to slightly discolor the parts, is an active oxidizing agent, and may, on a pinch, be used for general obstetrical antisepsis.

Application of antiseptic methods in hospital and private practice.

The essential elements of successful antisepsis may be embodied in one word—cleanliness; and the most comprehensive rule for its application in two—be clean. So long as we attain this ultimatum it matters little how we proceed or what means we employ, pure water[2] showing as favorable a record in one man's hands as strong mercuric solutions in another's. The time will come when the validity of this proposition will be generally accepted. One antiseptic after another is deposed to make room for a successor, and, as our ideas of the subject become perfected and broadened, the strength of our solutions lessens while our attention to the details of cleanliness increases.

The precautions which enable us to insure our end, of necessity, vary with the conditions which surround the patient, whether she be in the germ-laden atmosphere of a hospital ward, or in the pure air of the open country.

In hospitals, where the conditions are such that, almost of necessity, the causative elements of puerperal disease are ever present, though perhaps, not always making their presence known by active morbific action, where infection once admitted is so easily carried from one to another, and

[1] Hydronaphthol is a germisterilizer—an antiseptic and not a germicide. It is [illegible] germs [illegible] moderately strong solutions [illegible] in weaker solutions [illegible] antiseptic.

[2] Boiled, to free it from possible organic impurities. [illegible]

where there are usually many avenues of contagion from external sources, here to attain our end requires the strictest discipline and most thorough method.

Wards should be small, containing only a few patients each, should have no unnecessary furniture, should not open into each other, should be well ventilated, and should have impermeable walls and ceilings, that they may be perfectly and easily washed and thoroughly disinfected at regular intervals.

Doctors and *Nurses* should not go from septic to normal cases, and should not expose themselves to possible contamination by visiting surgical wards, necropsies etc. Before examining a patient their hands and nails should be thoroughly cleansed by scrubbing with soap and water and the use of some disinfectant solution; they should also invariably be washed before going from one patient to another. Their garments should be kept scrupulously clean, as infection might easily be carried in a soiled coat or dress. Indeed, it is safest to change the clothing entirely, and take a warm bath with plenty of soap, a scrubbing brush, particularly to hands, hair and beard, before going from a septic to a normal case. If these precautions are habitually and scrupulously observed, it is scarcely likely that an infection can be carried by the physician or nurse. A physician whose finger nails are habitually in mourning should give up the practice of obstetrics. It is best to allow no visitors or outsiders to enter the lying-in wards.

Patients, if possible, should receive a full bath and fresh clothing before entering the delivery room. The external genitals should be thoroughly cleansed before the beginning of the second stage. Prophylactic injections at this time are not necessary or advisable, unless there should be a suspicious purulent vaginal discharge, or reason to suspect possible septic infection, as their use, by constringing the parts and removing the natural mucus, increases the liability to perineal laceration. Examinations should not be made too frequently, the hands being cleansed before each exploration, by dipping in an antiseptic solution. If lubricants should be necessary, on account of dryness and tenderness of the parts, vaseline or any clean vegetable oil may be used.

After delivery in normal cases, vaginal or intra-uterine injections are not necessary, and should only be used when the finger or hand has been introduced into vagina or uterus to remove fragments of placenta or membranes, or where the fœtus has been dead or macerated. Immediately after the expulsion of the child the vulvar cleft should be covered with lint wet in whatever disinfectant is used, which should be kept in place until the patient is washed and dressed; this washing should be with the disinfectant solution, and the dressing should consist of a binder and the occlusion bandage devised by Garrigues,[1] which should be put on carefully, being spread out in

[1] Garrigues: *Medical Record*, Dec. 29, 1883. —"The patient is washed with the solution ($HgCl_2$ 1-1000) and the vulva covered with a *dressing* consisting of a piece of lint, six by eight inches, folded lengthwise, so as to be three inches wide; outside of that a piece of oiled muslin, nine by four inches; outside of that a large pad of oakum; the whole to be fastened by four pins to the binder in front and behind, by means of a piece of muslin eighteen inches square, folded diagonally, like a cravat, so as to form a kind of belt, five inches in width, for the reception of the other pieces of the dressing. This dressing is to be put on with the same care as we dress a wound after a capital operation."

front and behind broad enough to entirely cover in the genitals and prevent the access of any floating particles of septic matter. For from eight to ten days, or so long as there is much lochia, the external parts should be carefully cleansed every six or eight hours, with an antiseptic solution, and the dressing renewed. No vaginal or intra-uterine injections are necessary unless the lochia should become fetid or the patient develop septic symptoms (see VI).

It should be borne in mind that if the bichloride be the antiseptic used, any abrasions or lacerations of the vaginal mucous membrane will become covered with a yellowish-white film, which may easily be mistaken, by the inexperienced, for diphtheritic infiltration (see VI).

It seems proper here to add a word concerning the use of Credé's method, essentially an antiseptic procedure, for preventing the development of ophthalmia neonatorum. After the birth of the child, as soon as the cord has been ligated, its eyes should be carefully and gently washed with soft lint dipped in a saturated solution of boric acid, and immediately a single drop of a two per cent. aqueous solution of silver nitrate let fall between the separated lids upon the conjunctiva, the surplus being washed away at once by the lint and boracic acid. This treatment sometimes causes a slight catarrhal conjunctivitis, lasting for a day or two, but never anything more serious, and is a most certain preventive of the ophthalmia so much dreaded in lying-in and foundling asylums.

In private practice, where our principal care is to avoid bringing infection to the patient, we do not always need the elaborate precautions just described, using only those which our judgment tells us are necessary, in addition to the routine scrupulous cleansing of hands, instruments and exposed parts of the patient, the removal of all shreds of membrane or placenta, and the application of the occlusion bandage.

In private cases, also, it is not necessary, unless we have reason to suspect the presence of a gonorrhœal discharge, to apply Credé's treatment to the eyes of the new-born, a simple washing with a solution of boric acid or clean warm water being all sufficient.

Dangers and Contra-indications of Mercuric Salts.—It is well to sound a note of warning regarding the possible dangers of the employment of the bichloride solutions so commonly recommended, for, in addition to the not infrequent slight salivation of patients or attendants, from the free use of this agent, we have also to record serious and dangerous symptoms, and even lethal poisoning.

At Schroeder's clinic, in Berlin,[1] in a recently delivered primipara, a complete perineal laceration, extending high up the rectal wall, was stitched up while irrigated with a 1 to 1000 bichloride solution. Between the fifth and sixth day the patient developed moderate fever, with low pulse and a very fetid diarrhœa, dying on the twelfth day. The autopsy showed

[1] Hofmeier, in *Jour. of Obst.*, 1881, p. 18 and 19.

extensive gangrenous destruction of the entire mucous membrane of the large intestine, this condition continuing with lessening severity into the ileum. The kidneys showed congestive changes. An examination made at the Patho-clinical Institute demonstrated the presence of mercury in the tissues.[1]

In a second fatal case, at the same clinic, a young primipara developed slight eclampsia, was delivered by an easy forceps operation, and, suffering from uterine atony, was given a hot intra-uterine douche of three litres of a 1 to 1000 bichloride solution. Soon there appeared general depression, with great hyperæsthesia of the whole body, a subnormal temperature, and profuse fetid diarrhœa; these symptoms continuing until her death. The autopsy showed most extraordinary alterations in the intestinal mucosa, which was enormously swollen and partly gangrenous, the change being especially marked in the rectum and extending into the ileum. The kidneys were the seat of marked degenerative changes.

At Stadtfeld's clinic, at Copenhagen, a puerpera developing fever on the fifth day was given a large intra-uterine douche of the bichloride, 1 to 1500. She immediately showed slight collapse, and five days after, fetid diarrhœa, vomiting, and suppression of urine. The autopsy showed inflammation with numerous ulcerations of the large intestine and parenchymatous nephritis.

In a fourth fatal case, reported by Vöhtz, the fluid passed directly through the tubes into the peritoneal cavity.

Besides these fatal instances, numerous others are constantly being reported —in some the patient had received only one or two douches of a 1 to 2500 solution—where the symptoms, though serious, have been recovered from, these symptoms being in nearly every case expressed by a general constitutional depression, accompanied by a fetid, intractable diarrhœa, and the appearance of albumin in the urine. In nearly all we notice that the patients have had *previous renal disease*, or have been *weak* and *anæmic*, or that there has been *uterine atony*, or *extensive lacerations of the genital tract*, it being rare that the fluid has passed directly into the circulation or into the peritoneal cavity, as in the cases of Stadtfeld and Vöhtz.

A study of the cases just mentioned would show that in the above conditions mercurial douches should be contra-indicated, or should be used only in small amounts, and in very weak solution, preference being given to some other antiseptic, and that we should at all times be especially careful to insure easy escape of the fluid injected from the uterus, and free and complete drainage from the vagina, that portions of the solution may not be retained and absorbed.

[1] But little stress can be laid on the detection of mercury, for, as Taylor says ('Med. Jurisprud.," vol. i, p. 288), "Nothing is more common than to discover traces of mercury in the stomach, bowels, liver, kidneys, or other organs of a dead body."

VI.

PUERPERAL FEVER.

It is not my purpose to enter into a long discussion of the condition known as puerperal fever. I wish merely to state the conclusions at which I have arrived after a fairly large experience with the disease in several maternity hospitals abroad and here, as well as in private and consultation practice, which experience leads me to consider its nature to be as follows: I believe the majority of cases of so-called puerperal fever to be, in reality, cases of puerperal septicæmia, the septic infection coming usually from without, carried generally by the fingers, instruments, dressings, etc., and, no doubt, at times in the clothing or on the person of the attendant, but in exceptional cases transmitted through the medium of the atmosphere.

I am impelled to the last admission by the fact, that I have seen apparently spontaneous cases of puerperal fever in which all possibility of infection by contact could absolutely be excluded; neither physician nor nurse having for weeks previously attended a septic or contagious case. I have been unable to explain the occurrence of such cases except by transmission through the air by a so-called *status epidemicus* (I refer, of course, to cases in private practice),—unless I join the small minority of obstetricians, at the head of whom, in this country, stands Fordyce Barker, who still firmly believe in the occurrence of puerperal fever as a zymotic disease *sui generis*, that is, a disease produced by a specific poison of its own. I must confess that I have not been able to entirely divest myself of the belief that such a disease *may* exist, though I also believe that it is one of the rarest of exceptions.

Further, my experience has taught me that while, in many cases, the septic infection, however obtained, is the cause of the febrile symptoms, this infection may, in course of time (that is, provided the patient lives long enough), be thrown off and the symptoms still persist; the febrile condition will then be found to be due to some peri-uterine inflammatory process (see VII). The prognosis in this latter class of cases is vastly more favorable than that of cases due to septic infection pure and simple.

I do not propose to discuss the question of the relation of bacteria to the production of puerperal fever, since I cannot but consider the whole subject of bacteriology as in its infancy, and so unsettled as to leave it a matter of doubt whether, in the majority of infectious diseases, the bacteria produce the disease or the disease generates the bacteria. So long, however, as germs (bacteria, cocci, bacilli, etc.) are found in the secretions of infectious diseases, a safe plan, certainly, is to act on the principle that these germs should be removed with the discharges, and hence I advocate the use of germicide solutions, which also act as cleansing applications.

It will naturally be inferred that my views on the treatment of puerperal

fever—that is, septic fever—are precisely the same as would apply in the septic infection from open wounds in other parts of the body, namely, removal of putrescent tissues, scrupulous cleanliness, rational disinfection, reduction of supra-normal temperature, with sustenance of the general system. In the rare, presumably zymotic, cases, the necessity for disinfection will probably not be so urgent as where sepsis is present.

That the exanthemata cause puerperal fever I do not believe, for while after labor the maternal organism has lessened power to oppose the approach of disease, and is less able to withstand its inroads, scarlatina or other exanthem, when it appears at this time, still preserves its distinctive characteristics, though, perhaps, running an unusually malignant course; yet we cannot call it puerperal fever with any more show of reason than we could call a bruised digit from which the patient should happen to be suffering at this time a puerperal finger, or an acute nasal catarrh a puerperal coryza.

The *site of the infection* may be either at the vulva or in the vagino-uterine tract (lacerations of the perineum, vagina, and cervix; injuries to the uterine wall, decomposition of thrombi at the placental attachment, or of retained fragments of placenta, or of coagula; septic endometritis). It is of the highest importance to recognize and localize as much as possible the exact spot from which the infection proceeded, in order that the local measures may be directed chiefly to it, and, if still possible, the source of the infection be removed or its violence mitigated.

Varieties and Symptoms.—While various elaborate and minute classifications have been made of the protean forms of puerperal fever, practically we find that they blend so together, several forms often combining in one, and nearly every case showing peculiarities of its own, that, for purposes of bedside study, these divisions are misleading and confusing.

For strictly clinical purposes, and setting aside most pathological distinctions, our cases of puerperal septicæmia may be divided into three main groups: first, those most commonly seen, where the disease, beginning acutely, is of varying degrees of severity and often amenable to treatment; next, those types which begin gradually and insidiously, and linger in a chronic form, the patients dying, or as gradually passing back through the stages of convalescence to health; and last, those of an intensely malignant type, which appear and run their fatal course with appalling and terrible swiftness.

In all these forms of puerperal fever the first symptoms occur usually within three days after the labor; attacks coming on before this time are usually due to infection before delivery, while later the liability diminishes, so that if our patient reaches the seventh day without showing signs of infection she may be almost surely considered safe from sepsis; the exception to this rule being in certain rare cases where convalescence having progressed, apparently normally, even to the second or third week, a sudden elevation of temperature, with a chill and offensive lochia, show the insidious advent of

purulent endometritis and consequent septic infection. There is always a doubt, in these cases, as to whether the infection is auto- or heterogenetic.

In all the forms there are generally some premonitory symptoms, though these may often be overlooked, as they may occur equally from other slight degrees of morbid action, or disordered digestion, constipation, unusual irritation from breasts or nipples, physical or psychical disturbances, etc. The most usual of these symptoms are a tired and worn facies, with general malaise and a rise of temperature of more than a degree, a rapid pulse, severe and long-continued after-pains, tenderness of the uterus, loss of appetite, and slight tympanites.

These signs presage the more usual forms. At the inception of the fever proper we have a chill, light or severe, the severity being in direct proportion to the suddenness and extent of the temperature elevation. Coincident with the increased body heat which the chill announces the symptoms all become more decided, pain and tenderness over the uterus and abdomen generally become more marked, there is acceleration of the pulse and respiration, thirst, anorexia and general uneasiness increase, there may be nausea and vomiting, there is increased tension of the abdominal walls, the tympanites becoming more marked. Usually the higher the fever the more marked are these symptoms, though occasionally we will meet cases where even an extreme temperature rise is almost unaccompanied by other manifestations.

The progress of the disease may here be stayed, the symptoms all abating in a day or two, or they may continually increase, the pulse becoming very weak, thread-like, easily compressible, and above one hundred and twenty. The vomiting, which was at first merely of the contents of the stomach, now contains bile, or is a brownish, coffee-like fluid. Diarrhœa is present, or, less frequently, obstinate constipation. The breath acquires a peculiar sweetish odor and the skin shows a yellowish tinge, and often the numerous vesicles of miliaria. There is profuse sweating. The area of tenderness over the region of the uterus increases, the tympanites become very marked, the peritonitis which causes it spreading and often becoming general. The pulse becomes weaker and more rapid (130-160), the face, pinched and ghastly, is bedewed with drops of cold moisture, the lips become blue, the thick yellowish coating of the tongue brown and dry,[1] the hands shrunken and tremulous, and, together with the feet, cold and clammy. The mind may remain clear, but there is usually delirium or semi-coma. Here death usually claims the sufferer, though even when the appearances are most desperate the balance may be turned toward recovery. All or but a minority of these symptoms may be present in any given case. Locally we find the uterus large and flabby, but later on it may be fairly well contracted; the lochia, which may at first be temporarily suspended, are fetid, sanguinolent and purulent, or thin and acrid (looking and smelling like the washings from putrid meat); there may be pain and burning during defecation and micturition; the labia are often swollen and œdematous, especially where lacerations or bruises of the

[1] The tongue may remain clear and moist during the entire course of the fever.

vagina and vulva take on an ulcerative character and become covered with a grayish putrescent material, considered by some to be a true diphtheritic membrane.[1]

The next most frequent class of cases are those where the symptoms develop more gradually, and run a less rapid and usually less virulent course, the infection taking place slowly or by successive small increments; here the symptoms may be nearly the same as in the first group of cases, though less intense and less rapidly succeeding each other, the long continuation of the fever with the necessary sequences of long confinement to bed being more to be dreaded than its immediate virulence; or the progress of the disease may be marked by erratic chills followed by profuse perspiration, the temperature being very irregular, ranging from normal to 105° in a single day; the lochia scanty and not offensive; the tongue dry and brown or often moist and coated, and the general aspect like that of typhoid; or in severe cases the disease may not differ in any way from surgical pyæmia, metastatic abscesses forming in distant portions of the body, especially in the vicinity of the larger joints, and inflammation of the para- or perimetrium are often present, though general peritonitis in this condition is rare.

Though the infection in these cases may not show itself until the second or even, rarely, the third week after confinement, it is probable that it was incurred during labor, the absorption finally taking place from putrid matter contained in the cavity of the uterus or vagina, in a parametric abscess or ulceration in the genital canal, or more probably, from the breaking down of an infected embolus in some one of the uterine or para-uterine veins.

The most unfavorable of these cases of puerperal septicæmia are those in which the source of the infection is obscure; the patient complains of but little pain, no local inflammation can be detected, the lochia are sweet, and the high temperature, varying between 101° and 105°, forms the only alarming feature. A supra-normal temperature during the puerperal state is *always* due to a good cause, and may at any time mean serious trouble. If no more reasonable cause for the fever can be found than that of a perhaps obscure septic infection, it is a safe plan to assume such infection, and act accordingly.

In the third form, *septicémie foudroyante*, the organism is at once overwhelmed; the constitutional prostration is extreme and often the only symptom; the temperature may be anywhere from subnormal to very high, generally the latter; pain is not a noticeable feature; the pulse is weak, rapid and compressible; and, without rallying, the patient dies, the vital forces crushed and paralyzed by the intense virulence of the poison. Death occurs within the first twenty-four or forty-eight hours. In these cases the

[1] While true diphtheritis does undoubtedly occur in the puerperal period, it is not a common disease is always attended with most serious manifestations and sequences; the child, if left with the mother, almost to a certainty becomes infected, usually dying from the effects of the malady, and the mother, if she recovers, passes through a long and tedious convalescence. The so called "diphtheritic patches" so commonly seen during the puerperal period may be allied to, but are certainly not, true diphtheria.

temperature is often elevated even during labor, the infection probably taking place at that time.

Puerperal Malarial Fever.

In certain neighborhoods where malarial influences prevail, puerperal women may develop high temperatures, preceded by a chill, which simulate septic infection, and for several days may be entirely undistinguishable from it. The absence of local symptoms (pain and fetid lochia) shows the non-puerperal etiology of the fever, and the malarial surroundings will assist in making the correct diagnosis, which is confirmed by the rapid and striking antipyretic effect of large doses of quinine. If the malarial conditions continue, the chill and temperature may return, or persist in a more or less marked manner for weeks, and only a change of residence will effect permanent relief.

Pathology.—While it is not necessary to enter into a detailed description of the various pathological changes which may occur as the result of puerperal inflammation, it is well to have a general idea of the morbid changes and appearances which we may find post-mortem.

For a week or more after labor, in cases dying from other than puerperal disease, we find the inner surface of the still dilated uterus rough, especially at the insertion of the placenta, and covered with blackened, gangrenous-looking shreds of blood, mucous membrane and placenta. This condition should not be mistaken for the much more marked changes caused by septic inflammation, where, in one set of cases we may find a more or less extensive gangrenous inflammation of the interior of the uterus, with the sloughing off of shreds of necrotic tissue and the consequent formation of deep ulcers, which are apt to be accompanied by severe para- and perimetritis, or where the inflammation has been of a croupous character, and has affected the vagina, we find areas of necrosis, gangrene and ulceration; while, with or without either of these forms of inflammation there may be uterine thrombosis, purulent inflammation of the veins or suppuration and abscess of the uterine wall, and, owing to the spread of the infectious material by the blood, metastatic abscesses in various organs. The lesions of acute pleurisy, ulcerative endocarditis, purulent inflammation of the joints, hyperplastic swelling of the spleen and lymph glands, may be present, as in any acute infectious disease. In the excessively malignant cases of the third group the local lesions are but slightly marked, and general alterations, except those due to high temperature, entirely wanting.

Micrococci are very constantly present in the inflamed tissue, lymph vessels of the uterus, peritoneal exudations, and pyæmic abscesses, and it is not improbable that the destructive local lesions as well as the general constitutional infection are due to the presence of these organisms.

Prognosis.—It is difficult to state definitely the prognosis in any given case of puerperal fever, a fatal form often beginning and running its course with

but slightly marked symptoms, while a patient *may* recover after the most severe manifestations. Death is the rule when a majority of the symptoms described in the first group are present, when the disease assumes a pyæmic form, and when its onset is sudden and overwhelming. Generally the longer the beginning of the disease is delayed, the better the constitutional condition; the slower and stronger the pulse, and the lower the fever, the better is the prognosis. Convalescence may be rapid and complete, or, where there have been marked inflammatory changes in the uterus and its adnexa, or the debility is very great, slow and tedious.

Treatment.—"An ounce of prevention is worth a pound of cure." In no department of medicine is the truth of this old proverb more strikingly illustrated than in that which appertains to the treatment of the lying-in woman. The vital importance of prophylaxis has already been shown in the chapter on antisepsis, and its teachings should be strictly carried out. While we can in many instances prevent the access of the products of decomposition, or prevent their development when present, when once the septic germs have gained entrance to the fluids of the maternal organisms, their ravages are beyond our control; we can only endeavor to find and bar the avenue of their entrance, while at the same time we sustain, as best we can, the vital forces in their struggle with the enemy.

It is important to recognize the very beginning of the infection, for the sooner it is detected the more certainly can we counteract it. As the point of infection is always in some part of the genital tract, usually from some lesion of the vagina or cervix, it is very evident that local treatment is a primary necessity.

Local Treatment.—The vaginal orifice should be examined with reference to the presence of necrotic patches, which, when found, should be touched with a mixture of equal parts of liquor ferri persulph. and tinct. iodi comp., this solution possessing very marked and powerful antiseptic and astringent properties, disinfecting and preventing absorption at the same time.

At Winckel's clinic, at Munich, in cases of true vaginal diphtheritis, characterized by great constitutional depression, very high temperature, weak and irregular pulse of from 120 to 140, and stinking lochia, the exudations are cauterized with sesquichloride of iron, with remarkable results, the temperature falling as quickly and markedly as after intrauterine irrigation in pure septicæmia. This treatment sometimes causes great œdema of the parts adjacent to the ulcerations, which, however, is easily controlled by simple evaporating lotions.

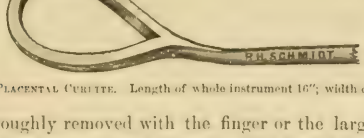
A vaginal injection properly given can do no harm, and should be used if there is the slightest fetor to the lochia, or where we suspect the presence of infectious material in the vagina; it should consist preferably, on account of its germicidal powers, of a solution of bichloride (1–2000), or biniodide of mercury (1–4000), retained portions of which may be, to prevent the risk of

possible poisoning by absorption, washed out by a solution of hydronaphthol or plain boiled water.

A clean fountain syringe should be used, with a vaginal tube of glass, about three-eighths of an inch in diameter and six inches long, with a rounded bulb, having several side holes but no central (terminal) opening. The external parts should be first washed, and with the stream running, the tube should be gently inserted into the vagina, the perinæum being somewhat depressed to allow of the free escape of the fluid. If the uterus is inclined to become relaxed it should be controlled by a hand placed over the fundus. When considered necessary to flush out the vagina after the use of strong mercuric solutions, the fluid used is poured into the bag of the syringe before it is quite empty, while, to avoid the possible entrance of air bubbles, the exit tube is momentarily compressed between the thumb and finger. Accidents can only happen through gross carelessness or ignorance.

Should we find no cause for infection in the vagina or cervix, having used, if necessary, a bivalve speculum to make our investigation certain, it is probable that the septic foci are contained in the uterus, and a careful digital examination and washing of the uterine cavity is then indicated. If the finger detects in the uterine cavity any secundines or coagula, these should

Fig. 168.



Mundé's Placental Curette. Length of whole instrument 16"; width of loop $\frac{3}{4}$".

at once be thoroughly removed with the finger or the large blunt curette (Fig. 168), and the uterus then irrigated. This should be done with most scrupulous precautions, the vagina being first thoroughly cleansed and rendered aseptic. The tube used should be of thick annealed glass, about one-third of an inch in diameter, bent to conform to the uterine axis, and pierced in its last four inches with eight or ten small openings, it having or not, according to the fancy of the operator, a terminal perforation.[1] The fluid to be injected should be a warm (99°–100°), weak (1 to 3 or 5000) solution of a mercuric salt or of hydronaphthol, or even simple, clean, boiled water. If a

[1] I object to a central terminal opening in vaginal and uterine tubes, for the following reasons:

1. Because, with a vaginal tube with central opening, the fluid may inadvertently be thrown into the uterine cavity, and thus at a period when the uterine lips and tissues are [illegible] it may cause severe uterine [illegible] dangerous [illegible]. I saw this occur in one case on the ninth day, the vaginal douche being given by the nurse merely for the purpose of cleanliness.

2. Although not often likely to occur, it is still not impossible that the jet of injection fluid thrown from the central terminal opening of a uterine tube may dislodge a fresh thrombus at the placental site, and so enter the veins, or granulations of a recent placental hemorrhage be produced. That the latter is not [illegible] were may thus take place has been proved in several cases of [illegible] I myself [illegible] the [illegible] the observation of a medical examiner in Massachusetts, and were reported in the *Lost Manuscript* [illegible] several cases were bubbles [illegible] to the right heart.

It would [illegible] that [illegible] with side openings it is well to have the latter [illegible] so [illegible] the jet [illegible] backward.

mercurial be used it should be followed by enough of the hydronaphthol or water to wash away any which may remain in the uterus, and so lessen the danger of poisoning. Whatever fluid is used should not exceed in amount two or three pints, should be injected slowly, and should be delivered from a clean fountain syringe or douche jar, held about two feet above the level of the patient. A bed-pan should be placed under the woman's hips, and, all being ready, the fluid should be allowed to flow through the tube, so as to positively exclude the danger of injecting air into the uterus, and while still flowing the tube should be passed into the vagina, and, guided by two fingers of the left hand, passed gently into the cervical canal and up nearly to the fundus, or, if we choose, we can pass the tube through the speculum. A free escape of the injected fluid should be insured by pressing the anterior lip of the cervix a little forward with the tube, and depressing the perinæum somewhat with the fingers. The advantage of the inflexible tube is that the position of the external os and the direction of the uterine canal having once been ascertained, the tube can often be passed by an experienced operator without the introduction of the finger. The tube need not necessarily be made of glass, though I prefer that material, on account of the greater ease with which dirt can be detected and removed.

If the uterus contains any septic matter, shreds and bits of tissue will escape with the first portion of the fluid, which may also have a more or less putrescent odor. If the fluid returns clear and clean there is usually no need for repeating the injection. So long as we do good by removing septic material I believe in continuing the intra-uterine douching; but having accomplished this end we only submit the patient to needless interference by repeating the procedure.

When the lesion is found to be in the vagina, as is usually the case, douches may be given every four to six hours; when in the uterus, every six to eight hours or oftener, if the fetid discharge continues and the temperature falls after irrigation. In regard to the frequency of the injections, however, every case must be a law to itself, the repetition being governed by the effects produced.

Intra-uterine douching should not be resorted to unless the infection can be shown to proceed from the uterine cavity, and is not indicated by every little rise of temperature which a puerperal woman may show. It is generally proper to wash out the uterus when fever follows the birth of a dead and macerated child, or an operation which has necessitated the passage of hand or instruments within its cavity, or where there is a fetid discharge which persists in spite of vaginal douching, where the uterus is large and flabby, or where we have reason to suspect the presence of decomposing bits of placenta or membrane within its cavity.

I desire to put myself on record in this matter of intra-uterine injections, which have been recommended by eminent authors in every instance of rise of temperature in the puerperal state. I do not agree with this practice unconditionally, for if there be no fetid lochia, no evidence of intra-

uterine decomposition, I believe there is nothing to be gained by intra-uterine irrigation, even though there be a rise of temperature. On the other hand, the presence of offensive lochia without a rise of temperature does not necessarily call for intra-uterine irrigation, since many women have offensive lochia without the slightest constitutional disturbance. In such cases I think vaginal irrigation all-sufficient. I wish to qualify these statements by saying that even in the absence of offensive lochia, if there be no obvious cause for the elevation of temperature, it may be a wise precaution to irrigate the uterus once or twice, but after such irrigation, there being no detritus removed from the uterus, I should consider further irrigation useless, and, perhaps, even injurious, and whether the temperature fell or not I should then look elsewhere for the cause of the rise, and seek to reduce it by other means.

Finally, I believe that intra-uterine irrigation should be discontinued as soon as it fails to remove decomposing matter from the uterine cavity, even though the temperature may not be reduced, for I think that I have seen the continuance of uterine irrigation under such circumstances cause hemorrhage, chills, abdominal tenderness, and be even followed by increase of temperature, which symptoms I am inclined to attribute to the traumatic irritation caused by the passage of the tube and the injection.

I think it important to state that a severe chill followed by rise of temperature even up to 103°+, with or without severe uterine colic, may occasionally follow an intra-uterine injection, even when given carefully by an expert through a widely patulous uterine canal. I have seen this apparently alarming result follow, not only an ice-water injection (when one might not unnaturally expect a chill), but once an irrigation of hot sublimated water. In patients who show this unpleasant susceptibility to uterine irrigation, it is well to avoid using it except under the urgent indications specified. The occurrence of the chill very soon after the irrigation will tend to show its true etiology, and the fever usually subsides within a few hours, under the usual measures.

Where there is an inflammation of the uterus or endometrium, suppositories of iodoform[1] introduced into its cavity produce very complete and lasting disinfection, exert a favorable influence over the inflammatory process, and seem never to exert any poisonous influence. They may be inserted by seizing the suppository with a strong pair of dressing forceps and sliding it into the cervical canal over two fingers of the left hand placed in the vagina against the cervix; these fingers can then shove the bacillus beyond the internal os; or if not able to insert it in this manner, we can place the patient on the side and insert it through Sims' speculum.

The insertion is often difficult because of the inflamed and tender condition of the parts and the irritable state of the patient, and though more easily introduced through the speculum, the use of the instrument, for obvious

[1] The formula recommended by Sparks and Bruns of Vienna is as follows: R Iodoform gm. xv; gummi arabici, cocoa butter [illegible] M. Make into suppositories of [illegible] Nothing has thus far been found, with cocoa butter to be just as useful, and they are much easier to make.

reasons, is often not feasible at this time, hence my experience with this undoubtedly useful agent is limited, and I hardly think that the majority of general practitioners will find its use practicable.

Symptomatic Treatment.—The symptoms that usually demand our attention, though mutually dependent upon each other, may be divided, for our purpose, into three groups; first, those caused more particularly by the localized inflammatory processes going on; second, the high temperature; and third, the constitutional depression.

1. The first indication is usually to stay the progress of the peritoneal inflammation, if present, and to relieve the pain which it causes, and this can most readily be done by the conjoined use of narcotics and local applications. This pain is usually severe, of a lancinating character, associated with shallow, hurried breathing, and is best controlled by the hypodermic injection of morphia, the amount of the alkaloid which will be required for this purpose varying greatly. In localized inflammations, from one-fourth to one-half of a grain may be enough, while if the peritonitis is more general, larger doses are required, enormous amounts being sometimes tolerated. Enough should be given to quiet pain without producing narcosis, and when this end is secured, the action should be kept up by the administration of smaller amounts, as may be necessary, the drug being continued as long as the indications remain. Where pain is not marked, as in the solely septic and pyæmic forms of puerperal fever, opiates are not well borne, and seem rather to do harm than good.

Other narcotics, as chloral or cannabis indica, are valuable, though not so reliable as opium. The doses given must, as with morphia, depend upon the severity of the symptoms, enough being used to make the patient comfortable and to keep her so as long as may be necessary.

At first, and so long as the temperature remains high, dry cold over the seat of inflammation affords great relief to the pain, and is a powerful means of checking the inflammatory process. Cold may be applied by ice-bags laid over one or both groins, as may be necessary, this means being best when the inflammatory area is small and the temperature not particularly high; better, by the use of a rubber coil, through which a current of ice water is made to circulate; or, in the absence of either of these means, by the use of ice-water compresses, frequently renewed. A thickness or two of cloth should always be placed between the bag or coil and the skin, that the local action of the cold may not be too intense. I have known the integument to become slightly frozen from neglect of this precaution.[1]

After the first violence of the symptoms has subsided, and when the temperature can be kept down by other means, cold should be discontinued and

[1] My assistant, Dr. Wells, tells me that, in a case which he saw not long since, where there was an exudation with much pain and tenderness to the left of the uterus, and high fever, an ice-bag had been left on the bare skin for two days, a superficial slough afterward occurring over the area covered by the bag. The patient recovered and the exudation disappeared, hastened in its absorption, no doubt, by the irritation caused by the condition of the integument.

warmth applied, by means of hot compresses or poultices, it having a more marked beneficial effect on the progress of the inflammation, and being exceedingly grateful to the patient.

Counter-irritation is valuable, and is best produced by the application of a turpentine stupe, repeated *pro re nata;* at a later period, when more prolonged irritation may be needed, blisters are useful. Tincture of iodine painted over the painful area, and covered with a compress, formed of a piece of lint or flannel wet with a mixture of equal parts of glycerine and a two and a half per cent. solution of carbolic acid, and this covered in its turn with oiled silk, forms a very pleasant and efficient counter-irritant.

The local abstraction of blood by means of leeches, though not much used here, is recommended by French and German authorities, and is undoubtedly efficacious in relieving both the inflammation and the pain, especially in plethoric subjects. General venesection is not to be thought of under any circumstances.

As a forlorn hope in some desperate cases of general puerperal peritonitis, with large purulent effusion, laparotomy may be done, and the peritoneal cavity cleansed by the use of a warm antiseptic lotion, this apparently foolhardy measure having been in some rare cases successful.

The distressing tympanites which so often accompanies peritoneal inflammation may often be much relieved by the application of turpentine stupes to the abdomen, and by the use of enemata containing about half a drachm of spiritus terebinthinæ mixed with castor and sweet oil. When these measures fail, a long rectal tube, carefully introduced, sometimes allows the flatus to escape, and when the symptoms demand it, all other means having failed, we may aspirate through the abdominal wall.

2. Since we have learned that a high temperature is in itself very injurious, by causing a more rapid oxidation and waste of the tissues, thus leading to enfeeblement of the entire organism and especially of the nervous centres, and that the increased rapidity and loss of power in the heart's action are caused by, and not the cause of, the febrile rise, we have also learned to employ in place of the old cardiac sedatives means and agents having a distinct inhibitory action on the production and maintenance of supra-normal heat.

This reduction of temperature may be accomplished in two ways: by the internal administration of drugs—lessening the production—and by external means—abstracting the surplus.

Of internal remedies *antipyrin*, as a pure heat-reducer, heads the list. As it has a somewhat depressing action, in common with all antipyretics, it should usually be given combined with alcohol in some form, and, where the heart is weak, with digitalis. As the fall in temperature which it produces is, though marked, not usually permanent, the best results will be obtained by repeated doses, a first dose of fifteen grains being given, and followed at intervals of an hour or so, as may be necessary, by doses of from five to ten grains until thirty to forty grains have been given. This quantity may be

repeated within twelve to twenty-four hours, if necessary. Used in this manner, I have uniformly obtained most excellent results, cases being exceptional where the temperature could not be markedly reduced and kept so. I do not think it advisable to give it in the large doses (gr. xxx–lx) recommended by some, as I have seen severe collapse follow a single dose of forty grains; on the other hand, I have never known of any ill effects produced when given as above described.

While heat-depressing drugs, as a rule, act, for the most part, by an influence on the tissue oxygenation, *i. e.*, by lessening the production of heat, the effect of antipyrin is probably principally due to the profuse sweating which it causes, this increasing markedly the abstraction of heat from the body surface.

Thallin, a drug similar to antipyrin, seems to be no more effective and less reliable than antipyrin. I have never used thallin.

Quinine, as an antipyretic, is a valuable agent, though in the majority of cases far greater reliance can be placed upon antipyrin as a means for reducing supra-normal temperature. When used in the continued forms of fever quinine should be given in a single large dose of from twenty to thirty grains, so as to produce a marked remission, the temperature often falling below 100° F. after its use. When the cinchonism, the disagreeable features of which may be much lessened by the conjoined use of bromides, has disappeared, should the temperature rise another dose may be given, though in cases where the first dose has not reduced the fever, it is not probable that a second will be of value.

In the remitting forms of fever it is more valuable, and, given in five-grain doses every four or six hours, moderates the fever, lessens the gastric and intestinal irritation, diminishes the sweating, and seems to have a general tonic effect. Capsules of Warburg's tincture sometimes act well when quinine itself has failed.

Salicylate of Sodium.—Second only to quinine as an antipyretic before the introduction of antipyrin, it is now but little used except in cases where there is a rheumatic diathesis.

Alcohol, in addition to its sustaining effect upon the general system, is an antipyretic of considerable power, and should be used combined with other remedies in every case. While usually the dose will be about a couple of drachms every two hours or so, it may require to be given in very much larger amounts, the quantity being regulated by the effect produced. So long as it produces good effects and does not cause symptoms of intoxication, we are not giving too much.

Where the fever is very high, or where there is peritoneal inflammation, the external application of cold should always be employed, the rubber coil before mentioned being a most efficacious and safe method of reducing the temperature, one which is grateful, which can be applied without disturbing the patient, and which can, with benefit, be continued as long as the inflammation continues active and the temperature supra-normal. It is a measure

which I can most strongly recommend, and which I use in nearly every case of puerperal fever.

Where the temperature is very high, and the coil does not reduce it rapidly enough, sponging the whole body with equal parts of alcohol and water, continuing the sponging for about ten minutes, and repeating the procedure after about the same interval, until the temperature is decidedly lowered, may be necessary.

I do not often have occasion to use the cold wet pack, the cold bath, cold affusion, or cold uterine or rectal irrigation, the coil being usually sufficient, and these last means, though undoubtedly efficient, being liable to produce alarming cardiac depression.

The good effects of cold are not produced alone by the immediate abstraction of heat, but also by a direct lessening of its production, through the medium of an influence exerted through the sympathetic and the medulla oblongata, as is shown by the continued fall in temperature for several hours after its continued application in a moderately severe degree. This secondary effect on the nervous system causes the application of cold to be a peculiarly valuable means of reducing temperature.

3. It is most important that the strength of the patient should be maintained, and as the appetite and power of assimilation lessen with the onset of the fever, and oftentimes completely fail, how to nourish the patient is often a difficult and perplexing question.

The food should be in liquid form and not too concentrated, and is best given in small amounts, at short intervals. Milk, either plain or peptonized, or as punch or egg-nog, is the best food, but sometimes disagrees with the stomach. Animal broths are often acceptable and appetizing, though they contain but little nutriment; the same may be said of the numerous "meat extracts." Light and delicate custards may be acceptable. Stimulants are useful, but must be given with discretion, champagne, tokay, old port, cognac, being most useful. Where there is a tendency to nausea, the food should be given ice cold and in very small quantities at a time, a teaspoonful often being retained and digested where more would be rejected. In the early stages, hot water may be serviceable in checking nausea; later, small bits of ice, or ice-cold carbonic water, or iced champagne, or small doses of strychnia, will be found most serviceable. When the vomiting is convulsive, the inhalation of a few drops of amyl nitrite, at long intervals, is usually an efficient measure in checking it.

When the stomach cannot retain or digest food at all, we may be obliged to resort to rectal alimentation to sustain the patient. When this procedure becomes necessary, the bowel, if it contains fecal matter, should first be cleansed by a copious enema of cold water, this also having a good effect in checking any tendency to diarrhœa which may be present, and after a half-hour's rest, the nutritive fluid, at about the body temperature, should be gently injected, the patient being assisted in retaining it by the pressure of a folded napkin over the anus. These nutritive enemata should not be repeated

oftener than once in four or six hours, and to promote their absorption, when their long continuance is necessary, the bowel should be washed out every other day with cold water. The nutritive injection should not be too bulky, measuring not more than from two to three ounces; a very useful formula being the yolk of an egg, half an ounce of brandy, and milk to make two ounces, to which an opiate may be added, when required, or a pancreatinized mixture of an ounce each of lean, very finely minced meat and milk may be used, to which, if necessary, brandy or other drug may be added after the artificial digestion is complete.

Purgatives are not often indicated, for when once the fever has begun, there is usually a tendency to diarrhœa, though at the very first, if the bowels have been constipated, a mild aperient is useful, or, preferably, an enema may be given. Marked diarrhœa should be checked. I have found astringents, bismuth and opium generally efficacious. In Germany, good results are obtained by a voluminous injection of cold water, either pure or to which a little of some astringent, as ferric chloride, has been added. This injection, to be effective, should be passed as high in the gut as possible, through a rectal tube or large elastic catheter.

A question which naturally arises to every practitioner who expects to be called to other confinements while he is still attending or has but lately ceased visiting a case of puerperal fever, is, *how soon is it safe for him to take charge of another labor case?*

The rule and only safe practice certainly is, *never* to visit a normal confinement case while attending a septic case of any kind. Consulting obstetricians who are obliged to see septic obstetric cases and operative obstetric cases in rapid rotation, seldom can be justly accused of carrying an infection, if they will but observe the cardinal rules of scrupulous personal cleanliness, thorough disinfection, chiefly of hands and nails, hair and beard, entire change of clothing, frequent bathing, and use the precaution never to go directly from a septic to a clean case, but always to employ beforehand the disinfectant precautions just mentioned. I know that I have *never* carried septic infection, simply because I observe these rules with unvarying exactness. Practitioners who have been so unfortunate as to have a succession of septic obstetric cases, would, however, do well to give up all obstetric work for at least two weeks, while following the above disinfectant directions. Scrupulous cleanliness, in my opinion, is identical with thorough disinfection.

Fig. 1.

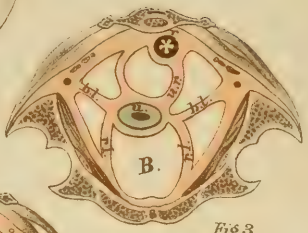
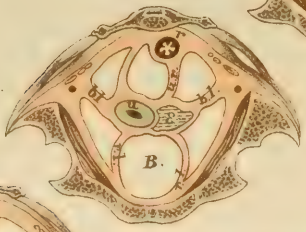


Fig. 3.

Fig. 4.



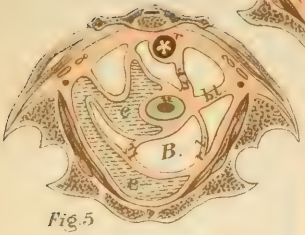


Fig. 5

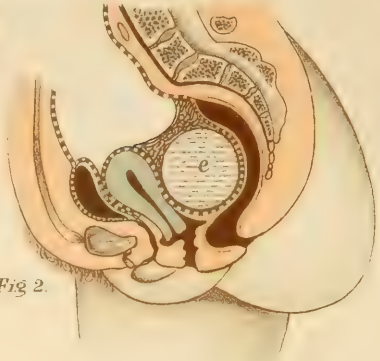


Fig. 2.

PLATE XI.

Modified and reduced from Fritsch's plates for clinical demonstration.

FIG. 1.

Vertical section of pelvic organs, showing (*e*) exudation in the cellular tissue, before and behind the uterus and in the anterior abdominal wall (pelvic cellulitis), *a–b* shows plane of transverse section of Figs. 3, 4 and 5.

FIG. 2.

Vertical section, showing (*e*) exudation in Douglas' pouch separated from healthy peritoneal cavity by adhesions (pelvic peritonitis).

FIG. 3.

Transverse section through pelvis; conditions normal; *u*, uterus; *r*, rectum; *b*, bladder; *u r*, utero-rectal ligaments; *r l*, round ligaments; *b l*, broad ligaments. Light spaces show sections of peritoneal pouches.

FIG. 4.

The same, with small exudation (*e*) to left of broad ligament (pelvic cellulitis).

FIG. 5.

The same, with large exudation (*e*) in right broad ligament, extending into the cellular tissue of the anterior abdominal wall (pelvic cellulitis) and distorting the pelvic peritoneal pouches.

VII.

PUERPERAL PERITONITIS AND CELLULITIS.

The disease which at the outset most closely resembles puerperal septicæmia, is that characterized by an inflammatory exudation into the tissues surrounding the uterus, that is, a puerperal peri-uterine peritonitis and cellulitis. In the early stages of a febrile disturbance in the puerperal state it is impossible to differentiate between a constitutional affection (septicæmia) and a local inflammatory affection, since both present similar subjective symptoms. Both are usually ushered in by a chill, which marks the beginning of a period of high temperature with more or less marked morning remissions; in each there is more or less tympanites and local tenderness, possibly fetid lochia, vomiting, etc., so that for several days it is absolutely impossible even for the expert to say whether the symptoms are due to septic infection or to localized inflammation, or to both.

After an anxious week, or perhaps even sooner, a distinct fullness, or positive exudation is detected, usually in the region of the broad ligament, though it may occupy any of the peri-uterine tissues. This exudation begins as a diffused thickening, which gradually becomes more circumscribed, hard and distinct, the uterus at the same time becoming more or less firmly fixed, and at times displaced laterally. Symptoms of dysuria and tenesmus are apt to be present when the exudation is very large, and the thigh of the affected side is kept flexed, to relax the muscles of the iliac space. The area of inflammation is usually exquisitely tender and fairly hard to the touch, though it should be stated that it may require a practiced finger to detect the exudation in cases only moderately pronounced. The perimetritic matting together of adjacent viscera may give rise to misleading impressions of the presence of exudation tumors. The lochial discharge may by this time become sanguinolent, when its offensive character will generally disappear.

When the disease has reached this stage the temperature usually remits almost to the normal in the morning, but may reach 104° to 105° F. in the afternoon. There is occasionally considerable pain on the affected side of the abdomen, and considerable tympanites. The exudation may occasionally extend outward and upward through the folds of the broad ligament to the iliac fossa, and then be felt by the finger on percussion through the abdominal wall. The uterus is generally in a condition of marked subinvolution, but there is no offensive discharge unless the temperature has been very high. If the inflammation and exudation have been chiefly intra-peritoneal there is more tympanites than if the disease is situated in the para-uterine cellular tissue, these symptoms being the more marked, the more the inflammation has extended over the general peritoneal surface.

In making the diagnosis the appearance of the facies of the patient, the absence of the sweetish odor of the breath, of the sallow complexion, of the repeated hectic flushes, of the dry, coated tongue, and the recurring rigors—these negative signs all serve to indicate the probable absence of septic infection.

In a certain number of cases the symptoms, both local and general, indicate a combination of localized inflammation and general septic infection.

Course and Prognosis.—It has already been indicated that the prognosis is much more favorable in these cases than in general septic infection. The more clearly we can recognize the presence of para-uterine inflammation, and the less the extent of the general peritoneal inflammation, the better are the patient's chances. I can fairly say that the great majority of these localized inflammations recover, the tumors either resolving or suppurating. In rare instances pyæmia or septicæmia may develop. When the exudation tends to resolve all the symptoms improve, the fever grows markedly less and soon disappears, the swelling grows less tender, harder, smaller, and more clearly defined, and after a varying interval disappears, either completely or leaving induration or adhesions behind. As regards the complete restoration to health, we should not forget that these adhesions between the uterus, its adnexa, and the intestines are liable to remain, and may cause, from their mechanical obstruction, obstinate constipation with accompanying pelvic pain and weak digestion. In these cases, again, even when the trouble may have apparently ceased, any unusual exertion or exposure is liable to excite fresh inflammation, and entail fresh complications.

Large exudations, particularly those into the cellular tissue, are more apt to break down and suppurate during the post-puerperal period than when occurring in the non-gravid condition. When this unfortunate complication occurs it can generally be referred to extreme weakness and exhaustion of the patient, or to some imprudence. The temperature continues elevated and shows, as in hectic fever, marked exacerbations and remissions, the pulse remains weak and rapid, there are usually repeated chills, appetite is lost, and there is often severe pelvic pain. It is often difficult to demonstrate the presence of pus, fluctuation being obtained easily only when we can feel with one hand the wave produced by the other, or where the tissue intervening between fingers and fluid is thin. Œdematous infiltration of the surrounding tissues may give a very deceptive impression of the presence of pus, and the tumors sometimes formed by the matting of intestine have been mistaken for purulent accumulations. In most cases the diagnosis can be made by careful abdominal palpation and bimanual (abdomino-vaginal) examination, the exploring needle being called in, if necessary, to settle the question. The abscess, once formed, may open spontaneously, or become encysted or absorbed. Spontaneous rupture may take place into vagina, rectum, bladder, a coil of intestine, uterus, through the abdominal wall, or

exceptionally into the peritoneal cavity,[1] in this latter case at once lighting up a usually fatal general peritonitis. Where a natural fistula is formed there is danger from the exhaustion from long continued suppuration, from septic absorption, and from amyloid visceral degeneration. Where the pus becomes encapsulated it may remain for a long time innocuous. The ultimate prognosis may, therefore, be very materially influenced by these eventualities.

The great majority of pelvic abscesses follow puerperal exudation into the pelvic cellular tissue, occurring as often after premature delivery as after labor at term, and complete restoration to health, both as regards the immediate febrile condition and the later resolution of the abscess, is the rule.

Treatment.—At first the treatment should be similar to that described in the previous chapter, with the exception of the disinfectant irrigation, intra-uterine and vaginal, which, as the indications are wanting, should be omitted. The temperature may in these cases remain high, with morning remissions, for from two to three weeks, or longer, and will then simulate very closely that of peritoneal inflammation in the non-puerperal state. I have felt myself obliged to keep on the ice-coil and employ antipyrin *pro re nata* for nearly three weeks, in several severe cases in which complete recovery took place.

After the temperature has been reduced to normal, persistent blistering is of the greatest use in promoting absorption of the exudation, one blister being followed by another so soon as the former is healed. In the interval between the blisters, hot poultices covered with oiled silk should be conscientiously applied so long as the size of the exudation or local pain keeps the patient in bed. In mild cases tincture of iodine with or without poultices will usually suffice.

Should suppuration occur the pus should be thoroughly evacuated, the abscess cavity washed and kept clean and freely open, there being always danger of septic infection where the pus is at all confined.

In very small abscesses, holding not more than an ounce, aspiration may be all sufficient, but in larger cavities the best results will be obtained by free incision and drainage, after which the abscess cavity soon contracts and cure generally follows. Where the abscess has taken on a more chronic form, and deep sinuses have formed, the chances of total recovery are not nearly so good, though even here, the treatment by free incision and drainage, with, perhaps, curetting of the abscess walls, gives the best results.

It is almost needless to remind the attendant that it is most important to sustain the general health and strength of the patient, at first by stimulation, and later by tonics and nourishing food. The administration of preparations of iron, in my experience, materially hastens the absorption of large exudations, especially where the patient is very anæmic.

[1] See articles by the author on treatment of pelvic abscess, in the *Archives of Med.*, Dec., 1880, and *American Journ. of Obst.*, Feb., 1883.

VIII.

LACERATIONS OF THE GENITAL ORGANS AND THEIR INFLUENCE ON THE PRODUCTION OF SUBINVOLUTION AND ALLIED PATHOLOGICAL CONDITIONS.

After a normal labor, and where the tissues of the genital tract have undergone no extensive injuries from their laceration during the passage of the fœtus, the usual physiological involution of all those parts immediately concerned in the function of parturition is completed, or nearly so, by the end of the second month after confinement. How different do we find the condition when, the cervix or perinæum having been torn, their ununited, granulating, hyperæmic surfaces become a seat of constant irritation, the congestion and hyperæmia, normal factors in every granulating wound, though pathological elsewhere, being confined not alone to the immediate vicinity of the lacerated surface, but extending throughout the whole of the contiguous parts, and thus preventing or seriously impeding the normal retrograde metamorphoses which should occur after childbirth.

It is my intention here to discuss the causative influences which lead to the lacerations of the cervix and perinæum (other lacerations, such as ruptures of the uterus, etc., not coming within the scope of this paper), and to speak of the pathological results which may follow these injuries, so that, knowing both the cause and effect, we may more intelligently and earnestly strive to prevent them. Though both of these lesions and their morbid sequences often co-exist in the same person, each then rendering the effects of the other more marked, it is better that we study the effects of each separately.

1. *Etiology and Pathology of Cervical Laceration.*

In speaking of *laceration* of the cervix we mean a traumatic division of the lips of the intravaginal portion, involving a part or all of its tissues. The traumatic agency which produces this laceration may be always represented by the presenting part of the child, usually the head, which, being rapidly forced through the yet imperfectly dilated cervical canal, is the cause, in the great majority of cases, of the tear. Premature escape of the liquor amnii before the cervix has become dilated, softened, and retracted over the presenting part, and, especially, unusually severe and prolonged contractions of the uterus by which the child is forced rapidly through the cervical canal, are the chief factors in the production of a lacerated cervix. Other conditions which possess a more or less important causative influence on its production are rigidity of the os; conical cervix; cicatricial induration and hyperplasia from previous disease; cystic disease of the cervix, rendering it non-elastic and friable; flexion of the uterus, causing the expul-

sive force to be directed more against one lip than the other; previous cellulitic adhesions and contractions which may prevent equal dilatation of the lower segment of the uterus, and occasionally the unduly forcible introduction of the hand of the operator or of instruments into the uterine cavity. That it can be and is, in a certain number of cases, produced by the unskilled and careless use of the obstetrical forceps, in rapidly extracting the head before dilatation is sufficiently advanced, cannot be denied, and in these cases the blame of its occurrence should rest upon the operator. I am confident, however, that the number of lacerations produced by the forceps is exceedingly small in proportion to the whole number of lacerations or even of forceps operations, for an experienced operator may even prevent a rupture of cervix and perinæum by gently and gradually evolving the head and regulating its progress with this instrument.

All fissures of the cervix which produce pathological symptoms or changes are the result of parturition. Instances where the cervix has remained fissured, so as to demand subsequent operative treatment, after its division for sterility or dysmenorrhœa are so very rare as to require no notice in this connection, it being a well-known clinical fact that a slit in a non-parturient cervix can with difficulty be prevented from closing, so that a repetition of the division is frequently required.

Laceration of the cervix is especially liable to occur during premature deliveries, on account of the unprepared condition of the cervix and lower uterine segment for its normal function of dilatation at term. Even as early as the second month, when the elastic ovum seems hardly capable of producing such an injury, laceration may occur, and has been reported by many gynecologists, I myself having seen several such cases.

Since the etiological causes above described are most likely to be present during a first confinement, it is manifest that the larger proportion of lacerations occur then, though if the lesion is not discovered until the woman has borne several children it may be impossible to say when it happened, for it is possible that the cervix, like the perinæum, may escape at the first and be torn at a subsequent labor. The first proposition, however, that the laceration is most likely to occur at the first delivery, is sustained by practical experience.

When the cervix has been lacerated to any considerable extent, and the wound has not healed at once, for the reasons given in the first paragraph, the uterus remains hyperæmic, and instead of resuming practically its antegravid shape, size and histological condition, remains larger, heavier, more succulent, its mucous lining pulpy and hyper secreting, its peritoneal covering hyperæsthetic. In time the irritation and hyperæmia constantly present lead to the formation of new connective tissue, the condition of subinvolution changes to that of hyperplasia, the succulent tissue becomes dense, hard and anæmic, the terminal nerve filaments are compressed by the firm, dense, newly-formed tissue, and the protean neurotic affections, the hystero-neuroses, appear.

The uterine appendages have also felt the malign influence extending from

the hyperæmic cervix, and the same congestion and imperfect involution is shown in the relaxed ligaments, œdematous cellular tissue, and enlarged and tender ovaries, and more, the weakened and relaxed ligaments are unable to support the heavy uterus, which sinks toward the posterior vaginal wall while the fundus tends to fall backward; the ovaries, after falling from their normal position, change their hyperæmia to hyperplasia, and the slightest accidental impulse may, and often does, light up an inflammatory process in any of the peri-uterine tissues.[1]

In addition to these changes in the uterus and its adnexa the cervix itself undergoes alterations of almost equal importance. The lacerated lips become glazed over by cicatricial tissue, which occludes the orifices of the cervical glands, with consequent retention of their contents and swelling of the cervix by their distention (cystic hyperplasia). The cicatrix, especially that in the upper angle of the rent, compresses the terminal nerve filaments which it involves, and through communication with the sympathetic system produces reflex neuroses in various parts of the body.[2] The relation between some of these neuroses and the laceration is so mysterious as to be inexplicable, and is not credited by many gynecologists, but as numerous cases are on record in which the repair of the laceration by a plastic operation has secured a cure of the neurosis, this relation would seem to have been proved in such instances. These neuroses may be either of a physical or mental character, from a simple neuralgia to a chorea, general anæmia, or functional dementia.

If the lacerated cervix does not cicatrize over, or only the angles of the rent heal, the remainder of the lips may undergo cystic or papillary hyperplasia, or both; the separated lips evert, drawn apart by the natural tendency of the flaps of a divided elastic tube to separate when its circular fibres are divided, and, chiefly, by the traction exerted on either lip by the attachment of the various organs adjacent to the part when the patient is in the erect position, and the mucous membrane lining the cavity of the cervix is rolled out (ectropium). This eversion, in the minor degrees of laceration is but slight, but when the rent extends to the vaginal junction and is bilateral, the whole cervical canal, to the internal os, may be laid bare and the tips of the everted lips may touch the vaginal walls. If the laceration is unilateral the ectropium is usually much less, though even then the cervical canal may be laid bare to above the vaginal junction.

In consequence of the chronic passive hyperæmia of the part, maintained by the irritation of the tear, and the cicatricial interference with the normal discharge of mucus from the cervical glands, there is a hyperplasia of all the elements of the cervix, which becomes decidedly, oftentimes enormously, enlarged. The exposed mucous membrane of the cervical canal becomes

[1] Ovaritis and cellulitis are frequently found in connection with and probably depending on the laceration. The cellulitis or peritonitis may have occurred immediately after the injury, and thus are probably to be explained those cases in which the rent has extended into or through the vaginal vault, and the cervix is found bound down by cellulitic exudation, or is drawn to one side by the contraction of effused lymph.

[2] "Minor Surgical Gynecology." Mundé, N. Y., 1885, p. 342.

thickened, granulations spring up, and the glands develop into mucous polypi. By friction against the vaginal walls during walking, through coition, and the softening of the epithelium of the diseased part by the constant discharge, a raw, eroded surface soon forms, on which the swollen papillæ and distended follicles are clearly visible, and from this erosion oozes a profuse, serous fluid, which mingles with the thick, glairy, discolored mucus discharged in abundance from the gaping cervical canal. The appearance of such a swollen, hyperæmic, and eroded cervix with its everted lips studded with papillary excrescences, may so closely resemble epithelioma as to compel even the experienced specialist to call the microscope to his aid in deciding between the two affections. A hyperæmic and hyperplastic condition often extends upward to and even beyond the internal os, with resulting cervical and corporeal endometritis, the latter frequently complicated by the formation of vegetations. In consequence, we have menorrhagia, at times so profuse as to endanger the life of the patient. Profuse menstruation also often occurs, merely from the subinvolution, when no vegetations are present.

It will be readily understood that the various irritations to which the gaping cervical canal is exposed soon develop a hypersecretion of that part, which increases as the glands become hyperplastic and the cervical endometrium more and more rolled out. A profuse catarrhal endotrachelitis is therefore the natural accompaniment of many cases of cervical laceration, and often its only troublesome symptom. In a rather small proportion of cases the catarrh exists without any ectropium of the cervical lining, and I am inclined to attribute the hypersecretion to a subinvolution of the cervical glands after the last confinement. Indeed, I believe this subinvolution, due in itself to the laceration, to be part cause of the chronic endotrachelitis in many cases, even before the subsequent cystic hyperplasia develops. I believe that laceration and cervical catarrh hold the relation to each other of cause and effect, in spite of the view expressed by some prominent authors that the tear occurs because the cervix is degenerated and softened by the hypersecretion. If the latter view were correct, laceration should be less frequent, for chronic catarrh of the cervix in the nullipara is not a very common disease.

Another, not so very rare ultimate result, is the degeneration of the raw, hyperplastic, everted surface of the torn cervix into malignant disease. Cases are constantly occurring where, in carcinoma of the cervix, the original existence of a deep laceration can be recognized. I have observed many cases of this kind, and the inference of cause and effect is irresistible. How many cases have been neglected or cauterized for months, only to terminate finally in carcinoma, we can but conjecture, and rejoice in the possession of instruments and knowledge which now enable us to diagnose and repair this injury[1] before it is too late.

When no eversion of the torn lips takes place, we may still have sub

[1] Made [illegible]

involution, cervical catarrh, and reflex neuroses; but usually the local and general effects of the laceration are much less marked than when the lips are everted. In a certain proportion of cases laceration of the cervix produces neither subinvolution nor any of the results above described, and therefore, requires no treatment; and it is equally true that subinvolution, ovaritis, chronic cellulitis, cystic and papillary hyperplasia of the cervical endometrium, endometritis, etc., may occur from other causes, but, occurring together with a laceration, it is generally fair to assume that they depend upon it.

There are still two conditions which, appearing only at certain times, have not yet been described. These are incapacity for conception, or absolute sterility; and its converse, the tendency to abortion, or virtual sterility. It may seem at first sight a curious fact that these two conditions should result from the same pathological process, the laceration, on the one hand forbidding conception, on the other facilitating it, by means of the unusual gaping of the cervical canal. The explanation is easy when we consider the changes subsequent to the lesion and their consequences. The thick, semi-purulent mucus discharged by the hyperplastic glands in the cervical canal virtually plugs the passage and prevents the entrance of the spermatozoa, or washes them away if they have succeeded in gaining a foothold. Besides, the purulent corporeal secretion may interfere with their vitality, and the hyperplastic endometrium may oppose a mechanical barrier to the upward progress of the spermatozoa, or afford a poor soil for the nidation of the ovum. Or, granting that the cervical canal is found free from mucus, as no doubt often happens, and the other obstacles fail, conception takes place, the ovum develops, and gradually expands the cavity of the corpus uteri. The absolute sterility has been overcome and the woman is pregnant! Now steps in the laceration again, to destroy her hopes. As the uterine cavity expands, the organ assumes a spherical shape, with a short, broad, flattened cervix attached to its lower segment; the cervical canal is practically effaced, the internal os, in lacerations of the third degree, is immediately continuous with and contiguous to the vaginal tube, and its tissues are therefore directly exposed to the irritation of friction against the vaginal walls, and the injury so liable to be inflicted by coition. The result of these factors is that the internal os gradually opens, a slight hemorrhage from the endometrium takes place, uterine contraction sets in, and the ovum is expelled. This train of events may occur again and again, the patient becoming each time more and more of an invalid and less capable of reproduction. While these results frequently follow, there are numerous instances where women with extensive lacerations not only conceive readily but carry their children to term, are easily delivered, and make good recoveries. These seeming contradictions, together with many other of the hidden factors of sterility and conception, belong, as yet, to the mysteries of nature.

Another condition which is frequently present as a result of laceration is dyspareunia, the reasons for which will be readily attributed to the patho-

logical changes already described. Painful coition will naturally increase the chances against conception, since that act will probably be less frequently and perfectly performed.

The diagnosis of cervical laceration immediately after labor is unsatisfactory and difficult; the finger introduced in the vagina finds the cervix soft and flabby, and oftentimes, if not expert, is not even able to distinguish it from among the surrounding folds and flabbiness. The extent of a laceration also is very apt to be much over-estimated, a tear which after a month or two will be insignificant and need no treatment, often appearing very large.

With a speculum—the largest Sims, or bivalve—these difficulties are to a certain extent overcome, for we can judge more accurately of the extent of a cervical lesion by sight than by touch. It is very seldom justifiable, however, to make a specular examination immediately after labor, on account of the probable exhaustion of the patient, the difficulty or impossibility of getting sufficient light, the difficulty of exposing the cervix amidst the surrounding flabbiness, and the natural reluctance and repugnance of physician and patient to propose or submit to the ordeal. For these reasons it is a rare thing for me to make a specular examination immediately after delivery. Almost the only condition which imperatively demands it is persistent arterial hemorrhage from a cervical artery; in which case the artery can be tied or the laceration closed, the sutures, of silver, being passed precisely as in the secondary operation (described in all modern text-books on gynecology[1]), and allowed to remain in situ for from eight to ten days, or even longer. I do not think that the immediate suture of a lacerated cervix is justifiable under any other circumstance than the one just mentioned, persistent hemorrhage, a most material objection to the immediate closure being the interference with that free discharge of the lochia which is so essential, both as lessening the danger of septic absorption and promoting involution. While this in itself is a sufficient contra-indication to the immediate operation, a primarily large rent often heals spontaneously, or contracts so much by cicatrization, after a few months, that it becomes insignificant, produces no evil symptoms and requires no operation.

At the end of a month, when the diagnosis can always be easily made, it is advisable to examine and satisfy one's self of the condition of affairs, and determine whether a rent is present which might require a secondary operation.

Such secondary operation may be done at any time after six or eight weeks, though when undertaken too early, before sufficient involution has occurred, and while the uterus is still very succulent and hyperæmic, it is more apt to fail than when done later.

2. *Etiology and Pathology of Perineal Laceration*:—

While the etiological factors in perineal, as in cervical, laceration may with proper care be so reduced that the number of unavoidable lacerations

[1] Mundé, l.c. p.

is but small, still there are conditions which may render the most skilled care ineffective in preventing the tear. In this latter class would belong unusual rigidity of the perineal structures, as met with in primiparæ over thirty years of age; unusual size of the child's head; persistent occipito-posterior positions; want of development of the maternal soft parts; low and narrow pubic arch; a friable and weak state of the perineal tissues, so that they may part like wet paper under very slight pressure, which may occur without any appreciable reason, or be caused by the inflammatory exudation following a too prolonged second stage, or the infiltration of chronic œdema, or of condylomata, or specific ulcerations, or marked varicosity of the veins of the perineal region.

Preventable lacerations are usually caused by the too rapid or forcible delivery of the head or shoulders through structures not yet prepared for so great dilatation. Complete lacerations, which should never occur except under the rarest conditions, are usually caused by the precipitous extraction of the head by the forceps in the hands of an unskilled or very excited operator.

The best means of dilating a rigid perinæum is the slow advance of the fœtal head, and by properly regulating this advance the number of lacerations which may be called wholly unavoidable is made comparatively small, though when the patient, partially anæsthetized or not, becomes unmanageable, and the pains spasmodic at the critical period when the head passes the perinæum, a laceration may occur, even in the hands of the most expert obstetrician.

The method of supporting the perinæum which I have adopted, and which I use with good results, is as follows: When the head bulges the perinæum, and begins to distend it to the extent of safety, I place two fingers, index and middle, of my right hand in the anus, and the thumb upon the child's head, thus placing it very completely under my control, and allowing it to descend or holding it back at my pleasure. After the occiput has escaped well out from under the pubic arch, the head is to be gently, and very slowly, "shelled out," between the pains, by the fingers in the rectum, it being pushed up as close to the symphysis as possible. During this time the patient may be either on the back or side, at the option of the operator; in my opinion the side is preferable, as in that position the woman is less able to bear down, and forcibly expel the head before the perinæum is sufficiently distended. Another good method, with the patient on the side, is to cover the anus with a napkin, and place the palmar surface of the right hand against the perinæum, with the thumb on one side and the fingers on the other, pressing the perinæum upwards or backwards, as may be necessary, and during the passage of the head, keeping it pushed well up towards the symphysis. The other hand passed over the woman and between the thighs —separated by a pillow placed between the knees—assists in pressing the head back. Though this method is a good one, it does not give the operator such complete control of the head as the one first described. When an anæs-

thetic is used, and it is invaluable at this stage, it should be pushed so as to cause marked diminution of the uterine contractions. I cannot refrain from particularly emphasizing, as the result of my experience, that the less hasty the delivery of the head, the less likely is the perinæum to be injured, and in making this statement, I would call attention to the fact, that no danger to the child accrues from the head resting on the perinæum for ten or fifteen minutes, or longer, so long as air has not entered the child's lungs, or the fœtal heart does not show evidence of cranial compression or interference with funic circulation.

The immediate danger from a lacerated perinæum is, that it increases the surfaces from which septic infection may take place; the secondary consequences, described below, are usually much more important and disagreeable. While a slight rent may heal spontaneously, the chances against natural union are in the majority, and this majority increases in a geometrical ratio, as the depth of the tear is greater.

As in laceration of the cervix, so in laceration of the perinæum, and from nearly the same causes, do the contiguous structures, in this latter case the vaginal walls principally, undergo the normal retrograde changes imperfectly, the irritation of the granulating, ununited perinæum causing primarily, as a natural result of the interference with circulation and nutrition, an imperfect and slow involution, and later, from lack of their natural support, a sliding down of the flabby and relaxed vaginal walls together with the contiguous portions of bladder or rectum, one or both, and displacement of the uterus. These changes may take place in two ways:—

1. The posterior vaginal wall, relaxed and subinvoluted—this subinvolution showing itself in the thick, redundant condition, in the hypertrophy of the normal rugæ, and by more or less of a protrusion of the bulb of the urethra, simulating cystocele, and of the posterior wall, simulating rectocele—this redundant, heavy wall, left unsupported by the very factor which caused the condition, the torn perinæum, gradually slides down, and the uterus, deprived thus of its support, little by little, partly tips, partly is drawn backward and downward. Then, usually, the anterior vaginal wall, which has all this time steadily resisted the absence of its natural support in the erect position, the lower part of the posterior vaginal wall and perinæum, is forced down by the varying pressure of the elastic bladder, and drags with it the already partly prolapsed uterus. Thus we have, in natural sequence, rectocele, descensus and retroversion, cystocele, and complete prolapsus uteri.

2. Precisely the same final results are obtained when the changes begin in the anterior vaginal wall, which, deprived of its support, sags down, dragging with it the adjacent portion of the bladder and the uterus. We then have cystocele and descensus with *anteversion* of the uterus. Eventually the posterior vaginal wall begins to prolapse, the uterus is dragged down still more, and the fundus retires in the only direction where it has room, namely, backward, and we get precisely the same condition as in the first instance.

It must not be supposed that we must invariably have all these sequences

of a lacerated perinæum, or inevitably have any of them. Most frequently we find only a rectocele with retroversion and descensus, next a cystocele with descensus, with about equal frequency a rectocele and cystocele with descensus and retroversion, and more rarely a descensus of the first or second degree without prolapse of the vaginal walls, the uterus in this latter case being generally heavy and subinvoluted. In the one case it is a dragging from below, in the other a sinking from above. Why in one instance a rectocele, in another a cystocele, and in a third a combination of these conditions should be the predominating feature, is often difficult to determine.

When, after labor, the cicatrization of the rent takes place, the hyperplastic mucous membrane of the posterior vaginal wall is often drawn down and out by the contraction of the cicatrix, which separates the labia majora and causes the vulvar cleft and vaginal orifice to gape. If, as is frequently the case, the rent has extended some distance up into the vagina, or if it has been slightly lateral, distortion of the posterior vaginal wall and remnant of perinæum may be caused by the cicatrization. The size and shape of the cicatrix may be recognized by its smooth, shiny character, and by the fringes of tissue which often ornament its borders.

In women who have had a number of severe labors, with great over-distention of the perinæum, a condition of that body is frequently met with which practeally corresponds to its destruction by laceration. This condition has been attributed to a diastasis of the muscles from the central tendonous apeneurosis, leaving only the skin and mucous membrane with a little cellular tissue and fat to represent the muscular, firm, elastic perinæum of health.

It is generally safe to assume that the deeper the rent the more certain and distressing the symptoms, particularly the descensus, though cases are occasionally met with where a laceration even to the sphincter is unattended, even after many years, by the least prolapse of either vagina or uterus. This condition can be explained by an exceptional firmness of the vaginal walls and suspensory ligaments, as well as by very perfect involution of the uterus. In complete rupture, even in the worst cases, prolapse of the vagina and uterus is rather the exception than the rule, though rectocele is a common feature. This apparently improbable condition is explained by the fact that in these very bad ruptures there is usually plastic infiltration into the periuterine cellular tissue or the broad ligaments, the heritage of previous inflammation, or there is cicatricial induration of the vaginal wall, which prevents descensus, or the cicatricial retraction of the anal sphincter and posterior vaginal walls may act as a barrier to prevent the protrusion.

When there is true or false rectocele the labia majora are separated when the patient is erect, and if there be a firm cicatrix at the site of the tear this separation is constant, whatever may be her position. I have known even slight partial laceration to produce this effect where the cicatrix happened to be very broad. The vaginal orifice being thus made to gape, the vaginal tube is more or less exposed to the entrance of air and dust, the result of

which is a profuse irritating discharge which excoriates those parts with which it comes in contact.

Retention of air in the vagina—garrulitas vulvæ—while the patient is in the recumbent position, or when she happens to stoop forward, and its expulsion with an audible noise when a position is resumed which allows the intra-abdominal pressure to again assert itself, is a very unpleasant if not serious consequence of this vulvar gaping, and may cause great annoyance to the woman if she happens to be in the presence of others, who, of course, imagine the flatus to come from the rectum, its usual source.

Another result of the cicatricial covering of the posterior commissure and the gaping of the vulva is *painful*—where the penis rubs against the tender scar—or *unsatisfactory coition*, the separated labia and gaping orifice diminishing the friction necessary to perfect intercourse. In the one case the sexual act is dreaded by the wife, in the other not enjoyed by the husband. As a consequence of these two forms of dyspareunia, and especially because of the non-retention of the semen in the vagina after intercourse, in a certain proportion of cases of lacerated perinæum we find sterility. To understand how it is that the absence of the perinæum may produce this condition, we have but to compare the relations of the normal curve of the perinæum, posterior vaginal wall and external os to those existing when the perinæum has been destroyed. Naturally, the cervix dips down into the deepest portion of the vaginal tract, in which, in accordance with the law of gravitation, the semen accumulates after withdrawal of the penis. The external os is thus bathed in the semen, and if impregnation does not occur, it is not for want of opportunity. Sims, who first advanced this theory, called this vaginal pouch the *receptaculum seminis* and the contained semen the *lac seminis*. When the perinæum is destroyed the posterior vaginal wall curves downward toward the anus, and it is obvious that the withdrawal of the penis must be followed by the escape of the semen, and this, indeed, is what patients almost invariably report when they consult a physician for acquired sterility, and the perinæum is found to be absent. While practically the explanation is sustained in many instances, there are more cases in which the perineal laceration is not accompanied by sterility. This may be accounted for by the occurrence of ejaculation directly into the, in these cases often gaping, cervical canal, or by the mysterious fact that no matter what lesion of the genitals they may have, short of complete atresia or absence of the ovaries, nothing seems to prevent a certain proportion of women from becoming pregnant.

In *complete* rupture, though, for reasons already given, we are not so liable to have prolapse of vagina and uterus, we find in addition to the other results above described certain peculiarly distressing features. When the rent extends through the internal sphincter there is absolute incontinence, both of fecal matter and flatus; if only through the external sphincter, solid feces can almost always be controlled, and often their evacuation also, provided the rectal mucosa be not inflamed and irritable. Flatus is not usually under control when the external sphincter has been completely severed, though partial

fissures, involving only the outer fibres and leaving the inner fibres intact, do not affect the power of retention. In complete rupture retention may be greatly improved by cicatricial contraction of the lower extremity of the rectum or by bands stretching across the fissure. The presence of hæmorrhoids, external or internal, generally aggravates the irritability of the rectum. Many patients with complete rupture are perfectly comfortable and suffer no incontinence, except when diarrhœa sets in or when under mental excitement, when they are liable to an involuntary movement at any time or place. Absolute incontinence is the rule when the laceration extends above the internal sphincter, and women thus afflicted are among the most deplorable objects we can meet, even one with a vesico-vaginal fistula being less of a burden and horror to herself and others.

As a result of the exposure of the lower portion of the rectum, in course of time a catarrhal inflammation sets in, which often extends upward, and colitis, with its attendant severe colic and diarrhœa, intensifies the already miserable condition of the patient.

IX.

PRIMARY PERINEORRHAPHY.

Having shown in the previous chapter the manifold and serious pathological sequences which may follow and be caused by a perineal laceration, it remains for me to show how most of these evils may be prevented in a large majority of the cases by a means which should be—though not described in works on midwifery—recognized and employed by every practitioner of the obstetric art, that is, the immediate closure of the rent.

To render a description of this procedure intelligible, it is necessary to premise it with some general considerations of the lesion.

There are three varieties of perineal laceration, *partial*, *complete*, and *central*, and of these the first two may each be divided into three degrees, according to the extent of the tear. In the *partial*, the first degree is merely a nick of the fourchette, the second degree is midway to the anus, and the third degree extends to the very edge of the sphincter. (See Fig. 169.) In the *complete*, the first degree extends through the anterior fibres of the sphincter, the second degree one or two inches up the recto-vaginal septum, and the third degree through the internal sphincter. (See Fig. 170.)

I have made these arbitrary divisions because of the marked difference in the significance and gravity of the symptoms produced by each degree of the lesion, and because the distress produced by complete laceration is so markedly out of proportion to that induced by a partial tear.

In partial laceration the mucous membrane of the vaginal orifice, the

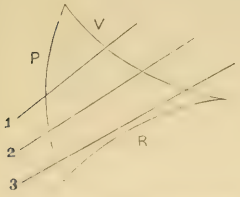
muscular aponeurosis of the perineal muscles, the superficial fascia, the subcutaneous cellular tissue and the skin—the structures constituting the so-called "perineal body"—are torn, while the recto-vaginal septum and sphincter remain intact; the vulval fissure, extended backward, now ends at the point of the external skin at which the rent stops instead of terminating at the fourchette.

In complete rupture the appearance is even more striking and characteristic. In addition to what has just been described, a more or less deep notch appears in place of the anterior arch of the sphincter ani, and through this notch, if the rent be a deep one, the scarlet mucous membrane of the rectum may be seen.

Partial ruptures of the first degree occur in about three-fourths of all primiparæ, and in the second and third degrees, in about one-fourth. Complete perineal rupture is, fortunately, not so common, and is usually caused by the precipitous extraction of the head by the forceps.

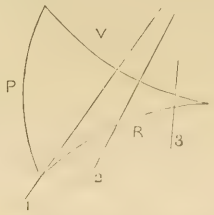
While partial ruptures can, in many cases, be avoided, yet often they will

FIG. 169.



Showing degrees of Partial Laceration. (P. F. M.)

FIG. 170.



Showing degrees of Complete Laceration. (P. F. M.)

occur in spite of the most skilled and complete precautions. I have made the statement before, that if all lacerations of the perinæum of more than the first degree were repaired immediately after their occurrence, the cases coming under the care of the gynæcologist for the secondary operation would be less than a quarter of the number now met with. While a certain proportion (nearly a third in hospitals, less in private practice) of these primary operations must be failures, and while it occasionally happens that even a deep tear unites with no other treatment than a binder about the knees to keep the legs together, yet union after the primary operation is the rule, and union without operation the exception. While some practitioners claim "never to have had a lacerated perinæum in a practice of many years," probably because they failed to look for it or to recognize its existence, and others are too timid to acknowledge that the tear has occurred, there are still a few who are so illogical as to claim, as septic material might be included in the wound, and so removed from disinfection (*sic!*), that the immediate closure

of a perineal wound is dangerous. I admit that there is danger from septic absorption from the constant flowing of the lochia over the open wound, but assert that there is no danger, but much of benefit, resulting from its closure.

There are but two conditions which forbid the immediate closure of any large perineal laceration: when the tear extends so far into the rectum as to render the operation, in the exhausted condition of the patient, too hazardous, and more rarely where there is extreme varicosity of the perineal vessels, so that the sutures, if passed, would necessarily traverse large veins, causing troublesome hemorrhage, and probably subsequent suppuration. In any case, if the rent cannot be closed within six or eight hours after delivery its operative treatment had better be deferred until cicatrization is complete, for while the results of *immediate* closure are so good, success is the exception when the operation is undertaken fifteen to twenty-four hours after labor.

Diagnosis.—After every labor, but especially in a primipara, the perinæum should be examined between a finger in the rectum and the thumb in the vagina, and the existence and depth of any rent noted. If a laceration is found, the knowledge obtained by the finger should be verified by thoroughly cleansing and exposing the vulva to a good light, when the labia may be separated and the full extent and depth of the tear, and whether or not it involves the sphincter or posterior vaginal wall, readily ascertained. The length of the rent should be estimated with the labia in their natural position of approximation, for it must be remembered that the swollen, discolored, gaping condition of the vulva at this time is very liable to give one a magnified impression of the extent of the lesion.

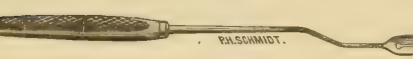
Having now found that the rent is at least one of the second degree, and that, as is usual, it involves the whole thickness of the perinæum, the care of the uterus should be given to the nurse, and the patient's friends being informed of the tear—the possibility of which should always be carefully impressed upon them in every primiparous labor—the instruments should be made ready in an adjoining room.

Instruments.—The needle should be stout, three and a half inches long, with bilateral cutting edges, and curved so that from point to head the distance is but two and a half inches. The needle-holder may be the small one from your pocket-case, which I have always found efficient, or a larger one, if you prefer it. While you may use ordinary twisted silk for your sutures, the No. 2 braided silk cord made by Archibald Turner & Co. is much to be preferred; whatever is used should be dipped, at the time, in a 5% solution of carbolic acid, or a 1–1000 solution of corrosive sublimate, and should be long enough for all the sutures that will probably be used. While this is all the armamentarium necessary when silk is used for the suture, there are some who prefer and use silver, and when this is used a slightly more elaborate outfit is necessary. I wish to have it distinctly understood that my preference is always for silk, in the primary operation, as it is easier to use,

requires fewer instruments, and has no projecting ends which are liable to scratch the patient, and which interfere with the proper cleansing of the external genitals from the lochial secretions; however, as many eminent authorities use and prefer silver, a description of the manner of its use will be included. The size of the silver wire for primary perineorrhaphy should be No. 26 or 27, and it should be so pure and malleable that it will not snap when tightly twisted. Wire sutures should be cut from ten to twelve inches long, so as to allow for loose twisting and handling before the final twisting, and may be here, contrary to the general rule with wire, threaded directly into the needle. To fasten these sutures we need the twister, shield, and crutch.

Operation.—When all is ready, proceed to the bedside of the patient and quietly inform her that she is slightly torn, and that a stitch or two, which will not hurt much, will be required, to close the rent. With a small tear

FIG. 171.

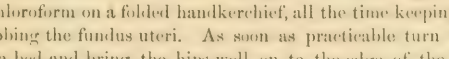


WIRE-TWISTER.—(P. F M.)

FIG. 172.

SIM'S SHIELD.

FIG. 173.



"CRUTCH" FOR BENDING ANGLES IN WIRE SUTURES.

and a moderately plucky patient no anæsthetic is necessary; but if she is nervous and objects, or if the rent is large, let the nurse give her a few whiffs of chloroform on a folded handkerchief, all the time keeping her hand on and rubbing the fundus uteri. As soon as practicable turn the patient crosswise in bed and bring the hips well on to the edge of the bed, where the assistant, if strong enough, can lift both limbs, with flexed knees and thighs, into the gluteo-dorsal position, or the right thigh can be supported by the assistant while the operator manages to control the left with his body. Now compress the uterus firmly, in order to expel any coagula or fluid blood which it may contain, and again entrust its care to the nurse. A disinfectant sponge or wad of absorbent cotton, about the size of an apple—not larger, or it would be difficult to remove later on—is now placed in the vagina, to absorb any blood and prevent its soiling the wound.

Now, if both thighs are held, seat yourself directly in front, where you will have unobstructed approach to the vulva; if only the right thigh is

supported, take your place outside of the left thigh of the patient, supporting it yourself. In either case—being right-handed—pass the index-finger of the left hand into the rectum as a guide, and insert the point of the large needle—firmly grasped in the needle holder—about one-fourth of an inch to the right of the bottom of the rent, and with a quick sweep carry it completely under the rent, emerging at a corresponding spot on the left side. The second suture is passed in precisely the same way, about half an inch above the first, and so on, until the fourchette is reached, where the uppermost suture must lie. While particular care must be taken not to allow any suture to escape from the tissues during any part of its course, and to have them all outside of and under any rents which there may be in the vaginal wall, such as are most likely to occur along the ascending rami of the ischia, it is especially important that the uppermost suture be very carefully placed; this should run, as nearly as possible, around the whole upper edge of the wound, or even slightly above it, and, if properly placed, will close the tear so completely when fastened that—as was first advocated by Alloway, of Montreal—in lacerations of moderate degree no other suture may be necessary.

Having inserted all the sutures, a partial rent of the third degree rarely requiring more than four, the wound should be thoroughly but gently cleansed, and beginning with the lowest, the stitches of silk are tied with the knot slightly to one side, until the uppermost is reached, when the sponge or cotton is removed, and the last knot tied. The ends are cut off about a quarter of an inch from the knot. If silver sutures have been used we begin as before, below, and the other sutures being held out of the way, the ends of the first, and of the others in succession, are crossed a little to one side of the wound and given a couple of twists to hold them temporarily. Then beginning again below, the ends of each in succession are seized by the twister about three inches from the wound, the projecting ends cut off close to the twister to get them out of the way, and the shield having been pressed over them at their intersection, they are twisted until the angle formed by their divergence can no longer be seen through the opening in the shield. When all are twisted, the ends, to keep them from scratching the patient's thighs and to facilitate removal, may be secured in a bit of rubber tubing about one-fourth of an inch long.

If there be rents in the vaginal wall above the perinæum it is well to sew them with a small needle and catgut before we unite the tear in the latter.

Fortunately complete rents are rare. I have had but one opportunity to close one immediately after its occurrence, and in that case I proceeded just as I have already related, the slight tear in the sphincter being included in my first stitch, and union being obtained by first intention.

In complete laceration involving the septum, I should first unite the rent in the latter, knotting the stitches in the rectum and cutting them short with the intention of leaving them to be absorbed or to cut themselves out, and then should proceed as in a partial laceration, using silver sutures.

The suturing having been finished, the parts should be washed clean, dusted with iodoform—if you use it—a piece of lint placed on either side of the stitches, if silver is used, and the patient's knees loosely tied together.

After-treatment.—The knees should be kept loosely bandaged together until a day or two after the removal of the stitches. So long as the lochia remains sweet no vaginal injection is necessary, though the external surface of the perinæum should be irrigated with an antiseptic solution several times a day; in these cases the occlusion bandage is especially useful. Vaginal douches may be carefully used, under the conditions already mentioned (p. 1136), but not otherwise.

The urine has, usually, to be drawn, this being done about every six hours, the urethra being exposed by very gently separating the nymphæ, and the vestibule carefully cleansed before inserting the catheter, so that blood or lochia may not be carried into the bladder. If the patient can urinate herself, I usually permit it after about twelve hours, as no harm can happen to the wound, if it be well closed, by allowing the urine to flow over the skin of the perinæum. Some of my best results have been obtained where no catheter was used.

The bowels having been thoroughly evacuated before labor, can be left alone for three or four days, unless they manifest a desire to move sooner, when an enema of soapsuds with warm water and sweet oil should be given, to insure a soft (not fluid) movement. If there has been no desire up to the evening of the third day a mild laxative should be given, and, at the first sign of an impending stool, the above enema.

It should be remembered that it is imperative that the passage should be soft and smooth, absolutely without scybalæ and unattended by pain, and that *straining* must be avoided. Next in danger to the newly united perinæum to a hard passage with straining, is a diarrhœa with straining. In case of need, capsules of oxgall (gr. v each) may be given every three hours for twenty-four hours, and be followed by an enema of equal parts of fresh gall and soapsuds, or of an ounce of glycerite of oxgall in a pint of warm water, to soften any concretions. If a thick, putty-like accumulation is found in the rectum, the nurse, or preferably the physician himself, must break it up and remove it with the fingers. Unless the nurse is in the highest degree reliable, the operator will always do well to attend to this first movement of the bowels himself, as it is then that the danger of re-laceration or non-union presents itself, even though the stitches are still *in situ*.

The diet should be the same as usual after labor: light but nutritious, an excess of milk being avoided until after the bowels have moved, as it is apt to produce scybalæ.

Removal of Sutures.—The sutures, if of silk, should be removed on the fifth day, the bowels having been thoroughly moved the day before. If silver has been used, the stitches should be allowed to remain in situ until the

eighth day. To remove the stitches the patient may be put in the same position as when the operation was done, except that the legs are to be kept nearly in apposition, and are held over the head of the operator, with legs and thighs flexed at a right angle; or, and I think preferably, we may place the patient on her side, in Sim's position. The parts having been carefully cleansed, we begin with the lowest suture, drawing on it slightly, and cutting it between the knot and skin, removing it by gentle traction *over* the line of incision. With silver sutures we liberate them from the rubber-tubing by cutting them all with one stroke of the scissors. Then the lowest wire is seized with a dressing forceps and gently drawn upon until the shining silver of its loop becomes visible close to the twisted portion; this is cut, and the suture gently withdrawn, the line of traction being *over* the line of union, that is, toward the side on which the wire was cut. Thus the sutures are successively removed, the left hand approximating the nates to lessen any possible tension. It is seldom necessary to leave in any sutures to be removed later, for by the eighth day either the parts will have healed or the operation will have failed. Care should be taken not to cut off the shaft of the suture at its very base, which accident may easily happen when a suture is deeply imbedded. If this should occur, it is almost useless, at the time, to seek for the hidden wire, though, of course, the attempt should be made, always remembering that too much manipulation will do more harm than leaving the suture longer until perfectly solid union has taken place.

After removing the stitches, the legs are again bound together as before for three or four days. The bowels should not be moved sooner than twenty-four hours after the removal of the stitches, and then with the precautions already mentioned. Afterward the bowels should be kept regular, and the perinæum greased with vaseline, to prevent possible cracking of the fresh cicatrix.

If union has not been obtained there is nothing to be done but to wait until complete cicatrization and involution have occurred, and then, if necessary, do the secondary operation,[1] a description of which may be found in most modern text-books on gynæcology.

Pathological Sequences of Primary Perineorrhaphy.—While in itself this operation rarely causes any increased danger to the patient, but rather lessens the risk of septic absorption, by shutting off the torn surfaces from contact with the vaginal secretions, yet, like any other wound, it is exposed to the accidents of inflammation, suppuration, and septic infection.

Œdema of the parts and inflammation along the suture tracks is not so very uncommon, and may be caused by the bruising of the tissues during the passage of the head, by too many and too *tight* sutures, or by the inclusion of blood in a pocket in the wound when the wires have not been kept well under the raw surface. If the inflammatory œdema of the wound is but moderate, nothing is required but the application of some evaporating lotion

[1] Mundé: *loc. cit.*

or vaseline strips; where it is excessive it may require the entire removal of the sutures, or the wire loops may be cut and the suture left in for several days longer, as a sort of a splint. Œdema of the tissues about the anus, which is often a source of great annoyance to the patient, may often be relieved by an ice poultice for forty-eight hours, or, if the swelling persist, by cutting the suture nearest the anus.

Extreme care in cleansing the wound of coagula, and in coaptating its surface so as to avoid the formation of pockets, and the observance of thorough antisepsis (cleanliness) in everything pertaining to the operation, are the surest means of preventing septic infection. Where inflammatory reaction occurs and pus forms in the wound, making its presence known by rigors and rise of temperature, and tenderness and bogginess of the wound, it calls at once for the removal of the sutures and disinfection of the raw surfaces. Of course, if any symptoms of puerperal septicæmia arise which necessitate the passage of the hand into the vagina the stitches have to go, though in any other case, where septic symptoms can be shown not to proceed from the perinæum, there is no reason why they should not remain.

X

THE DIAGNOSIS AND TREATMENT OF EXTRA-UTERINE PREGNANCY.

The subject of the diagnosis and treatment of extra-uterine gestation is one the interest and importance of which no one can deny. The condition, though comparatively rare, is one that we all may meet with, and that most unexpectedly, so that it should be of vital necessity to all to be conversant with what is known concerning the symptoms and conditions that may lead us to suspect its existence, to be able to make that suspicion certainty, and to know that we have at our command an agent that can at once arrest the growth of the misplaced ovum, and with equal certainty sweep aside the threatening death from the mother.

Unfortunately for the victims of ectopic fœtation, our warning of its existence may come only with its fatal ending, and the signs and symptoms which may tell us of its presence are often vague and indefinite; still, enough has now been learned to make its diagnosis more frequent and more a matter of certainty.

Its etiology and varieties, progress and termination have already been discussed in the body of this work (see page 1051), so that a slight recapitulation of these heads is all that is here necessary.

In its etiology many points are well known, while others are but matters of hypothesis. We most often find the condition associated with previous

sterility or pelvic inflammations, or conditions which have altered in some way the normal relations of the uterus, tubes and ovaries, while again we may meet it where we have no history which could lead us to suspect its advent.

Elaborate subdivisions of its varieties have been made and verified, on paper or at the necropsy, but for our practical consideration we need only three—tubal, abdominal and ovarian—with, perhaps, occasionally, two of these combined. The relative frequency of these we find, by taking the average of a large number of cases, to be about fifty-two (52 %) per cent. abdominal, forty-two (42 %) per cent. tubal, and six (6 %) per cent. ovarian, of which about thirty-seven (37%) per cent. occur between puberty and twenty, more than fifty (50%) per cent. between twenty and thirty, and nearly twelve (12%) per cent. in the years following.

In their progress and termination the three varieties vary in many important respects; while all may rupture, with probable fatal result, at any time after their inception, the tubal and ovarian, growing in comparatively non-distensible structures, rarely reach a development of more than three or four months before rupture. Cases have been reported by Ellwood Wilson, Graham, Schwarz, myself and others, where a tubal or tubo-uterine gestation has been spontaneously expelled through the vagina at a period between the third and fourth months,[1] and in the well-known case of tubo-uterine gestation of Lenox Hodge labor was induced at the eighth month by dilatation of the os uteri, the septum was scratched through which separated the ovum from the uterus, and the child and placenta were easily and successfully delivered. Such favorable terminations are, however, very rare. The abdominal form—the least dangerous—may begin *ab initio* as such, or may result from the rupture of the containing sac and discharge of the ovum in one of the other forms of extra-uterine pregnancy, the dispossessed germ attaching itself where it may fall. The pregnancy in this case may go on to full term, and then rupture during the pseudo-labor which occurs, or the fœtus, dying in the intact sac, remains innocuous for a variable time, and is then either absorbed or, more often, expelled from the maternal body by the natural processes of inflammation and suppuration, or removal by surgical procedure—the risk to the mother in any case being great. Rarely, a living child may be delivered by laparotomy or elytrotomy.

The mortality attending cases of ectopic fœtation is very great, having been estimated by Parry,[2] in his analysis of five hundred cases, as high as (67.2%) sixty-seven and two-tenths per cent., and later, by Puech,[3] at at least sixty (60%) per cent.

In the future, when electricity shall be the recognized agent in the treatment of these cases, and when diagnosis shall be more certain, this enormous mortality will no longer exist, for we have in the electric current the means to at once, safely and certainly, destroy the fœtus, and with it the principal danger to the mother—the danger of rupture of the cyst.

[1] *Am. Jour. of Obst.*, 1879, pp. 330–378. [2] *Extra-Uterine Preg.*, Parry, Phila., 1876, p. 169.
[3] *Gaz. Obst.*, Paris, 1879, vol. viii, p. 321

Symptoms and Diagnosis.

Unfortunately for those who suffer from ectopic gestation, its signs and symptoms are extremely irregular and oftentimes misleading, so that men of the highest ability and skill have not seldom arrived at diagnoses far removed from the true condition, the pregnancy only being suspected when the fatal hemorrhage occurred, when laparotomy was done for some other supposed condition, or when necropsy pointed out the misplaced ovum. The testimony of many names high in authority might be cited in this connection, and from among them we will choose that of Lawson Tait, in whose latest published case [1] "the symptoms were those of acute peritonitis, with intense pain, arising, apparently, from a tumor, which could be felt running from the right cornu of the uterus up towards the brim of the pelvis, shaped somewhat like a sausage. Its relations could be made out with great exactness, as the patient was a thin, small woman. It was supposed to be a sloughing myoma at the right cornu of the uterus; for no history could be obtained which in any way suggested tubal pregnancy." Laparotomy was done, and the sloughing myoma was found to be a tubo-uterine (interstitial) pregnancy. The patient made an easy and rapid recovery.

The symptoms given below are seldom all noted in any one case, though generally a fair proportion of them are present. There is usually a history of complete previous sterility, or of sterility following some pelvic inflammation, together with some of the signs of normal pregnancy, as morning nausea, enlargement of the breasts and areola, the presence in the breasts of milk or colostrum, the abdominal tumor.

The symptoms which first direct our attention to the probable state of affairs, are usually pain and menstrual irregularities.

The pain is usually severe, paroxysmal, and accompanied by the constitutional symptoms of anxiety, faintness, and depression. It may be a fixed, grinding pain in one iliac fossa, perhaps shooting down into the thigh; [2] or, it may be a colicky, cramp-like pain anywhere in the lower abdomen. Whichever it may be, it is exceedingly sudden in its appearance and irregular in its recurrence.

It happens in exceptional cases that the fœtal sac ruptures soon after or at the first appearance of the characteristic pain, so that when we are called to the patient we find her prostrated; passing from one fainting spell to another; the respiration sighing, gasping and rapid; the pulse rapid, soft and compressible; the face and extremities deadly pale, pinched, cold, and moist; the expression anxious, perhaps terrified; the mind clear; the abdomen full or even distended, soft, flat, obscurely fluctuant and warm; and often a history that "she felt something give way, and then felt faint;" in fact, all the well known symptoms of concealed abdominal hemorrhage.

While menstruation ceases when the pregnancy begins, we often have irregular, bloody discharges from the uterus, which, to the careless observer, may simulate menstruation, but which are of great diagnostic significance. These

[1] *Brit. Gyn. Jour.*, part ii, p. 178. July, 1886. [2] Lomas, *Trans. Obst. Soc. Lond.*, 1885, p. 264.

metrorrhagiæ may be, as described by Thomas (loc. cit., p. 233), irregular gushes of blood, ceasing and suddenly recurring without assignable cause; or we may have sero-sanguinolent discharges, with or without the expulsion, from an otherwise empty uterus, of shreds of decidual membrane. Though a decidua is probably always formed in the uterus, it does not always become early detached. When we find in the metrorrhagic discharges the decidua in the form of a *closed* sac containing no trace of a fœtus, we have a pathognomonic sign of extra-uterine gestation; this, however, occurs but rarely, the adventitious membrane being usually expelled in shreds (so that this symptom has been mistaken for membranous dysmenorrhœa), or in such a condition of disintegration that its detection is difficult and apt to be overlooked. The microscope may help us, by showing the large, round, decidual cells.

While the foregoing symptoms lead us to suspect the ectopic gestation, its existence can be assured only by physical exploration.

Abdominal palpation may show the presence of a tumor in one or other iliac regions, and in advanced abdominal gestation, where the ectopic sac simulates the gravid womb, we find a valuable sign, described in but few text-books, namely, that when we place the hand on and gently rub the pregnant uterus we feel the intermittent contractions of that organ, these contractions being absent in the extra-uterine cyst. The fœtus, also, can usually be felt much more distinctly than in normal cases, there sometimes seeming to be, from the thinning of the abdominal wall, merely skin between the fœtus and the examining hand. This sign is of considerable import, so that when, in examining a gravid woman, we find this abnormal distinctness of the fœtal parts to the touch, we should always think of the possibility of the pregnancy being extra-uterine.

On *bimanual palpation* we usually discover the uterus to be somewhat enlarged, though the increase in size may be but slight, and at the same time displaced either laterally, or upward and forward; on further palpation we discover a tumor in the situation of either broad ligament or posterior to the uterus, which is tense, elastic, immovable or nearly so, often giving a sense of obscure fluctuation, and vague or even well-marked ballottement, tender to the touch; palpation often bringing on a paroxysm of the cramp-like pains already described. There are also often small or large pulsating vessels in the vaginal walls about the tumor, and, in cases where the fœtus is of a development of several months, we may feel it through the vaginal walls with ease.

Repeated palpation demonstrates the rapid growth of the tumor when compared with that of the uterus. Early in its development, and while it is yet small, the situation of the tumor can generally be made out with some certainty, but its nature is not then so easily ascertained as later, when, on the other hand, it is not generally possible to say with certainty to which of the three forms it belongs, both on account of its size and of the adhesions which it has then formed.

When it is difficult, by ordinary vagino-abdominal palpation, to make sure of the nature or position of the tumor, we may palpate through the rectum, or dilate the urethra and examine with a finger in the bladder, the combined vesico-rectal examination often giving valuable results, or we may use any of these measures with the patient anæsthetized.

When we strongly suspect the existence of ectopic fœtation, though we may disturb a normally implanted or the twin of an extra-uterine ovum, it is not only justifiable, but often necessary, that we should examine the uterus with the sound, as to its length, or dilate the os and with the finger satisfy ourselves of the condition of its interior.

It is not superfluous to say that all these manœuvres should be carried out with care and gentleness, that we may avoid the very termination we wish to prevent, viz., the rupture of the cyst. The passage of the sound or dilatation of the os uteri especially should not be resorted to unnecessarily, for several cases are on record where they have set up contractions of the cyst and uterus which have resulted in rupture.

A review of these symptoms would lead us to infer the probability of extra-uterine gestation when we find—

1. A history of previous sterility or of pelvic inflammation.
2. The presence of some of the signs of normal pregnancy.
3. Symptoms of abortion, without trace of the fœtus.
4. The expulsion of fragments or of an entire decidual membrane.
5. Recurrent attacks of severe cramp-like or grinding pain in the hypogastric or iliac regions.
6. Great and sudden prostration following an attack of pain, with symptoms of internal hemorrhage.

This probability would be made certainty when, on physical examination we found, *per vaginam*—

7. The uterus somewhat enlarged and displaced laterally, or forward and upward.
8. An elastic, fluctuant tumor, on either side or behind the uterus which was
9. Tender to the touch, and in which palpation excited severe pain.
10. By ballottement, a floating body in the tumor.
11. The fœtal parts palpable through the vaginal walls.
12. Pulsating vessels in the vaginal walls near the tumor.

Per abdominem—

13. A tense, fluctuating tumor, possibly giving ballottement.
14. A tumor simulating the gravid uterus, but lacking the rhythmical contractility of that organ.
15. The sound of the fœtal heart.
16. The fœtal parts and movements.

The diagnosis of this condition is not generally difficult after we have once had our attention directed to its possibility. In some cases where the symp

toms have been present for a certain time, the child dying, they disappear; in cases like this the diagnosis of the nature of the tumor which we find may be difficult or impossible by means of the physical signs, but may suggest itself with some degree of probability through the previous history.

Treatment.—It is a somewhat remarkable fact that the treatment which in this country has been so uniformly successful, and which has been accepted by the profession as that proper for *all* cases of extra-uterine fœtation seen before the end of the fourth month, and for many others at an even later period, should be so little noticed abroad, that it is not even mentioned in most modern foreign text-books.

This treatment, which has proved itself successful in every case in which it has been tried (about thirty-five), is the destruction of the life of the fœtus by the passage of an electrical current through the sac containing it.

Both the galvanic and the faradic currents have been used, and with equal success, each having its partisans and its opponents. Galvanism has been used with a continuous current; an interrupted current; a frequently reversed current; and up to a strength of forty cells (strength in milli-ampères not noted), and though it has in certain cases caused alarming temporary symptoms of collapse, its end has always been attained, the unfavorable symptoms probably being caused by its too strong application.

While, theoretically, galvanism would seem to be much the best form of electricity with which to destroy the life of an ectopic fœtus, faradism has been quite extensively used, and has proved itself just as efficient, while not producing the powerful electrolytic (chemical), physical, and physiological effects which have sometimes caused disagreeable and dangerous symptoms when galvanism has been employed. The effects of the faradic current being largely mechanical, it is not probable that it can do any serious injury when used for the purpose under discussion, even when its current is increased to the limits of the patient's endurance, and the fear that it would excite contraction of the tubal walls strong enough to precipitate a rupture of the cyst has not, thus far, been realized. As the walls of the tubes are but scantily supplied with muscular fibres, the chief danger of cystic rupture would seem to come from the powerful contractions which are apt to be excited in the abdominal muscles; these contractions may, to a certain extent, be rendered less energetic by using a large, flat sponge for the external electrode, so that the current passing to the external pole shall be as diffused as possible.

A possible effect of faradization in *interstitial* fœtation is the arousal of muscular contractions, by which the fœtus is propelled into the uterine cavity, as was done by natural contractions in the cases reported by myself and others. Whether such a propulsion of the fœtus into the uterus from the tube proper is possible, seems, as yet, doubtful. When the fœtus has once been destroyed, and we wish to promote absorption of the dead ovum, the use of faradism will probably not give as good results as will the employment of a moderate continuous galvanic current, the physiological effects of

the latter—the effects on circulation, absorption, and excretion—being much more marked than those of the secondary current.

While I am inclined to favor the use of faradism in the treatment of extra-uterine fœtation—in my opinion it being just as efficient, less dangerous, and more convenient, while the apparatus for its production is less costly and less cumbersome—the question, "what is the best form of electricity to use?" is not yet definitely settled, nor can it be without a much greater experience in the use of its various forms than we now possess. That, however, electricity in some form is the proper treatment is beyond a doubt, so that in any case where the diagnosis of ectopic fœtation has been made, or even only strongly suspected, before the fifth month, it seems, in view of the results obtained, but criminal trifling with the life of the patient to temporize or try other measures of treatment. After the fifth month, when the danger of rupture is not so imminent, it would seem right and proper to allow the gestation to go to term and then to do laparotomy, in the hopes of saving both mother and child.

The general method of the application of electricity should be as follows: The patient should be at home, in bed, with rectum and bladder both empty. We should be prepared for the occurrence of shock, and even for the performance of laparotomy in case of rupture of the cyst, though this latter accident has not yet occurred, and should have at least the means of treating, by hypodermics, hot bottles, etc., the first of these complications. Having any good faradic battery, we need, in addition, a ball electrode of about three-fourths of an inch in diameter, fixed on an insulated staff, for insertion into the rectum or vagina, and a flat sponge electrode for application to the abdomen, with, of course, the necessary conducting cords. Having mapped out the tumor, we place one electrode as closely in apposition to it internally as is possible, passing it for this purpose into rectum or vagina—usually we can do better through the rectum; the other electrode is then placed on the integument of the abdomen, over the tumor, opposite the internal electrode, and a slight current turned on, which is to be gradually increased to as much as the patient can easily bear. The séance should be for about five minutes, and should be repeated daily until there are well marked signs of the death of the fœtus, shown most surely by a diminution in the size and tenseness of the sac, and by the cessation of whatever signs of pregnancy may have been present. Galvanism may be used in the same way, beginning with few cells and gradually increasing the strength, using either a continuous or interrupted current.

The changes showing the death of the fœtus often manifest themselves on even the first day of this treatment, fœtal motion often ceasing after the first sitting; pain and soreness about the tumor disappear in a few days; the breasts become flabby; the sac soon begins to shrink; and after the treatment has been continued for ten or twelve days nearly always shows a marked diminution in size, the continuance of the electricity seeming to markedly hasten this process of its involution.

The following case-abstracts are interesting and instructive, as showing both the methods used and the results obtained:—

[1] Case I.—Case of Dr. Charles McBurney. Diagnosis of extra-uterine gestation—tubal, left side, third month—confirmed by Drs. Thomas and T. Addis Emmet. On January 3d, 1878, Dr. Rockwell met Drs. Thomas, Emmet, and McBurney, bringing with him a thirty-six cell galvanic battery. A sponge electrode mounted on an insulated handle was passed into the rectum, just under the fœtal ball, and a flat sponge electrode placed on the abdomen over the mass; a gentle current was passed at first, which was increased as the patient became accustomed to it, until, after five minutes, seventeen cells were in circuit. The current was interrupted about 120 times a minute, and, excluding short intervals of rest, the patient was under its influence about three minutes. The current was again passed the next day, using the force of twenty-three cells for three and a half minutes.

After the first application, slight painful contractions were excited in the fœtal envelope, and some tenderness was developed in the abdominal muscles, but neither pulse nor temperature were affected; after the second, decided and very painful contractions came on, so that opium had to be freely used, to quiet suffering. The pulse gradually rose to 112 and the temperature to 101½°. The whole abdomen was tender to pressure, but none of the symptoms were of a character to excite fear of inflammatory trouble. A discharge of blood from the uterus now began, and continued to the end of the case. On the evening of this day (January 4th), it was felt that the death of the fœtus was assured. The symptoms remained the same on the morning of January 5th, the contractions of the tube being very strong and often repeated. Careful palpation at this time showed the uterus non-contractile and quiescent in its normal position, while at its side the larger fœtal shell could be distinctly felt—round and hard. Two hours after this examination the tumor suddenly greatly diminished in size, while the uterus became distended, blood pouring from it freely. Vaginal examination now discovered tense membranes protruding from the os; these were ruptured, and soon a fœtus and placenta were expelled. Examination the next day revealed the uterus somewhat tender, the fœtal sac being also plainly felt, though insignificant in bulk as compared with its former size. Patient made a perfect recovery.

Case II.—In the practice of Dr. C. E. Billington. Right tubal pregnancy, third month. Diagnosis confirmed by Dr. Thomas, who advised electricity. Galvanism applied by Dr. Rockwell; fifteen cells; rapid interruptions. Repeated three times, on alternate days, though fœtus was probably killed by first application; tumor immediately grew smaller, and in two months had nearly disappeared.

Case III.—In the practice of Dr. Bache Emmet. Diagnosis confirmed by Drs. Thomas, and T. A. Emmet. Galvanism by Dr. Rockwell; ten to eighteen cells; rapid interruptions. This treatment, which caused considerable distress, was three times repeated, at intervals of one or two days, and was successful in arresting the pregnancy.

Case IV.—In the practice of Dr. Everett Herrick. Diagnosis confirmed by Drs. Thomas and Emmet. Galvanism by Dr. Rockwell; one electrode in rectum and one on abdomen; four séances, at twenty-four hour intervals. Extra-uterine mass steadily diminished and entire recovery followed.

Case V.—In the practice of Dr. N. S. Westcott. Diagnosis confirmed by Dr. Thomas, who advised electricity. Normal uterine pregnancy in connection with tubal gestation. One pole was applied to the tumor through the vagina, and the other placed over it externally, and the constant current, rapidly interrupted, of a maximum strength of twenty-four volts, was used by Dr. Rockwell, during three sittings, during and after which the tumor decreased markedly in size. Normal uterine pregnancy not disturbed.

Case VI.—In the practice of Dr. ————. Patient a young, unmarried woman. Nausea and areolar changes. Tubal pregnancy in fourth month. Galvanism by Dr.

[1] *New York Med. Journ.*, vol. xxii, No. 3, and *Med. and Surg. Electricity*, Beard & Rockwell, Fourth Ed., N. Y., 1883, page 606.

Rockwell. On account of the great distention of the tube, the current was passed with great care, with one pole in the rectum and the other externally. A current strength of about sixteen volts was used, beginning mildly, quickly increasing the force without interruption, and allowing it to pass in a continuous stream for a moment, and then repeating the procedure. Two sittings, at interval of twenty-four hours. Tumor began to decrease, and in two weeks was only half its former size; after some months entirely disappeared.

[1] Case VII.—In the practice of Dr. H. Marion Sims. Ectopic fœtation, third month. Diagnosis positively confirmed by Dr. T. A. Emmet. The size of the cyst was such that operation was urged immediately, and for fear that the sac might be ruptured through uncontrollable movements of the patient, Dr. Emmet advised the administration of an anæsthetic. Ether being given, shocks from a galvanic current of but sixteen volts in strength were passed by Dr. Rockwell through the fœtal mass, this mildness of the treatment being necessitated because of the unusual nerve irritability and the violence of the muscular contractions. Though the fœtus was probably destroyed at the first séance, the operation was repeated three times, at intervals of a few days, to ensure absolute certainty of its death, and to aid absorption. The cyst rapidly diminished in size, and the patient in a short time was entirely cured.

Case VIII.—Mundé. The patient consulted me February 6th, 1884, to ascertain whether she was pregnant. Last coition was December 1st, immediately after the cessation of a menstrual period, and since she had not had any show at the times of her periods, but had a slight bloody discharge twice, at irregular intervals. She had increasing nausea and colicky pains in lower abdomen, which were growing worse, and which had for some days produced faintness. There was oozing of colostrum from the nipples on pressure, and areolar changes. The uterus, but slightly enlarged, was pressed somewhat to the left side, the right half of the pelvic cavity being occupied by an oblong, irregular, deeply fluctuating mass, about the size of a goose egg, slightly movable with the uterus. Bimanual palpation of this mass caused intense pain, and brought on the faintness and colicky pains of which the patient had complained. Large pulsating vessels could be felt in the right vaginal pouch. Sound showed the uterus to be three inches in depth. I at once made the diagnosis, and advised the destruction of the fœtus by electricity. To share the responsibility, I proposed a consultation with Dr. T. A. Emmet, who saw the patient the next day, at his office, and not knowing my diagnosis, pronounced it to be a pregnancy of the right tube, and advised galvanism. After this examination the patient had so much pain that I prescribed a morphine suppository, and fearing that delay might result in rupture of the sac I determined to pass the current that very afternoon. At 4 P. M. I found the patient much prostrated, but as I preferred to run the risk of producing a rupture by the electricity rather than let the sac grow even twenty four hours longer, placing a leather covered ball electrode in the rectum, and the other pole, a flat sponge, over the mass outside, I passed the current of my newly-filled galvanic battery through the sac, gradually increasing the strength to twenty four cells and rapidly breaking the current. The sitting lasted about ten minutes, and the shocks were quite painful. I did not think this current too strong, for the same force had been used in Mcllurney's case. I left the patient feeling fairly comfortable, and no more prostrated than before the application.

Early the next morning I was called, and found that the patient, whose nausea and retching had continued all night, had sat up in bed toward morning, to vomit, had been seized with a violent pain in the abdomen, and had fallen back in a faint. I found her perfectly conscious, features pale, pinched and clammy, pulseless at the wrist, skin and extremities cold. One thing only led me to doubt a rupture of the cyst, and that was the strength with which she could turn about in bed and answer questions. While evi

[1] See Board of Rockwell, for full case report, et seq., for case I. to VII. inclusive.

dently in a state of collapse, the prostration did not seem to me to be exactly like that from hemorrhage. I could not but hope that it might be merely shock from the repeated examinations and the galvanic current through so sensitive an organ as an over-distended tube. I made a gentle vaginal examination, and found the outline of the mass as distinct as the day before. In any case, the only active measure, laparotomy, could not be carried out on a patient in so profound a state of collapse as to be pulseless at the wrists; she would simply have died on the table. Hence, if there was a rupture, all I could do was to stimulate her until she rallied sufficiently to justify laparotomy; and if there was no rupture, then that operation was not indicated. I therefore ordered hypodermics of brandy, each containing five minims of arom. spir. ammonia, one to be given every fifteen minutes, in different parts of the body (the patient's stomach would retain absolutely nothing), sent for a nurse, and went home for my laparotomy instruments, in case at any moment they should be required. The physician who was hurriedly called in, and whom I found at the bedside when I arrived, Dr. Black, of the United States Army, on leave of absence and temporarily residing in the neighborhood, kindly stayed with the patient, and was relieved later by my assistant, Dr. E. H. Grandin. On my return, several hours later, I found the condition unchanged. The hypodermics were continued during the day, some fifty in all being given.

The next morning there was a faint trace of pulsation at the wrist; gradually it increased, and we began to hope; the retching diminished, and the patient could retain cracked ice. Her abdomen was very sore, and she complained a great deal of colicky pains on the right side. To make a long story short, she gradually rallied, began to retain nourishment, and in a week was able to sit up in bed, and in two weeks lie on a lounge. The sac had become somewhat harder, fluctuation was less distinct, pulsation had disappeared, but the mass was not perceptibly smaller. The breasts had become flabby, but they still secreted colostrum. Although there could not be any reasonable doubt of the death of the fœtus after such a series of galvanic shocks, still, to make sure, I thought it best to pass the faradic current through the sac a number of times, and beginning on the sixteenth day after the galvanic sitting, I made six faradic applications to the sac, one pole in the vagina, the other over the mass on the abdomen, using the full strength of a Kidder tip-battery, and frequently breaking the current. One sitting per day was given, lasting about fifteen minutes. This treatment caused no pain or shock whatever. From this time on the patient improved rapidly, regained her flesh and color, and by the end of the fourth week was able to go out. The colostrum gradually disappeared from the breasts, but the sac diminished very slowly, so that when I last saw her at my office, on May 19th, three months and a half after the galvanic shock, it was certainly still two-thirds as large as at first, although perfectly solid. All pain in it had ceased before she was allowed to go out. Menstruation reappeared on April 12th, and again on May 7th, lasting seven days. The uterus was measured and found to be two and three-fourths inches deep. The lady left for Europe on May 21st, in perfect health, and without a complaint of any kind, and is still abroad.

[1] Case IX.—Case of Joshua G. Allen, in 1869. Abdominal pregnancy; fourth month. The tumor was found behind the uterus, which was empty, and five inches in depth. The diagnosis was confirmed by Drs. Agnew and Pepper, the latter of whom examined the patient several times, and ascertained by ballottement the presence of the fœtus. One pole of an ordinary electro-magnetic machine was passed through a glass tubular speculum, and applied to the vaginal portion of the tumor behind the cervix; the other pole was placed over the tumor upon the abdomen. At first a weak current was used, producing no visible impression, but on the third application a powerful cur-

[1] *Am. Journ. of Obst.*, 1872, vol. v, p. 161.

rent was turned on, from which the patient recoiled with considerable fright, declaring that she felt something turning in the abdomen. After this a moderate current was used every three days, for two weeks. The tumor ceased to grow, diminished in size, and ballottement disappeared. Three years after there was still a well defined tumor, the size of a fist, which, however, gave no trouble.

[1] Case X.—H. G. Landis and Starling Loving. Left tubo-abdominal pregnancy, of nearly three months' growth. Treatment begun March 20th, 1877, with a Drescher faradic apparatus, one electrode in the vagina, the other on the abdomen. Current of moderate strength used and continued fifty-five minutes, the patient complaining bitterly of its effects, and especially of increased backache. It caused, also, weakness of the pulse, paleness of the surface, and faintness, together with contractions of the uterus and tumor. Electricity was used altogether eight times, at about daily intervals. On the third day of the treatment the pain was intense, but after that there was neither pain nor contractions, and on the fifth day she walked down stairs. Tumor steadily diminished in size, and within a year no trace of it could be discovered.

[2] Case XI.—Landis. Same patient as case X. In robust health until October, 1881, when she became impregnated. Ectopic fœtation suspected but positive diagnosis not made until December 6th, when she was attacked by "the typical and horrible pain of extra-uterine pregnancy." Diagnosis of left tubal-pregnancy in third month, corroborated by Drs. S. Loving and A. Dunlap. At this time, the induced current from a one-cell battery was used for ten minutes, when she felt much easier; this was repeated on the 7th, 8th, 9th, 11th, and 14th, when the current was used fifty-three minutes, and increased to its greatest intensity. No contractions or pain were observed after the 14th. A decidua came away on the 15th. Tumor steadily diminished in size, and gave no further trouble.

[3] Case XII.—J. C. Reeve. Abdominal pregnancy of three months. On March 28th, 1879, the secondary current of a single cell of a galvano-faradic machine was applied, as strong as the patient could bear it, for ten minutes, one pole being placed on the tumor in the vagina, and the other outside, on the abdomen. This was repeated daily, until April 5th, with no apparent effect, except some increase in the uterine discharge. On April 15th the breasts were somewhat flaccid, the tumor about the same size, but the vessels which had been felt coursing over it were fewer, and their pulsations much less energetic. May 11th, breasts entirely flaccid; no vessels felt on tumor; no more pain; sound which had passed three and a half inches now enters only a little deeper than normal; May 21st, normal menstruation began; June 4th, tumor only one third its former size; menstruation regular; August 31st, tumor much smaller and less accessible.

[4] Case XIII.—William T. Lusk. Tubal pregnancy of two months. Diagnosis corroborated by Dr. Thomas. The first application was made November 15th, a moderate current from a single cell battery being used, one pole in the vagina and the other on the abdomen. Two days later the tumor had grown larger, more tense and bulged the vaginal wall toward the vulva. The full force of the battery was now applied. The next day the sac felt flaccid, and by the end of the week had lost its regular outline. On the tenth day, the last application was made. The shrinkage at this time had become so unmistakable that no doubt was left as to the death of the embryo. Recovery uninterrupted. When last examined, all that remained of the tumor was a mass the size of an English walnut.

[5] Case XIV.—H. J. Garrigues. Right tubal pregnancy of two months. On March 4th, 1882, faradization was begun, one pole in vagina and one on abdomen: current passed for ten minutes, and gradually increased to limit of endurance, but not

[1] *Ohio Med. and Surg. Journ.*, Oct., 1877.
[2] *Medical News, Phila.*, 1882, vol. xl, page 578.
[3] *Trans. Am. Gyn. Soc.*, 1882, p. 180.
[4] *Trans. Am. Gyn. Soc.*, vol. iv, p. 45.
[5] *Am. Journ. Obst.*, 1882, p. 1.

used strong enough to cause real pain. Between this and March 18th, ten applications were made; the tumor began to diminish on the second day, and it and the symptoms both grew steadily less, the patient only complaining of slight occasional colicky pains on the 13th, and some soreness over the tumor. March 20th, tumor diminished to size of English walnut. Patient well.

[1] CASE XV.—DR. D. C. COCKS and A. J. MCCOSH; DR. THOMAS consulting. Left tubal pregnancy, three months. On March 28th, and eight following days, Dr. Cocks applied a strong faradic current from a Kidder battery, the application lasting seven minutes, one pole being in the rectum, the other on the abdomen. These applications were followed by no perceptible change in the local or general condition of the patient. On April 19th patient was first seen by Dr. McCosh. The tumor then was about as large as two fists, and was exceedingly painful on pressure. With one electrode in the rectum, and the other on the abdomen over the growth, a continuous current from sixteen cells, was passed for five minutes, causing considerable pain; then the current from ten cells, rapidly interrupted for one minute; the pain caused by this, however, was so severe, and the patient became so excited, that it had to be discontinued. The patient at this time had had, for five days, an evening temperature of 100.5° to 101.5°. On the 21st patient was etherized, and the current from twenty cells, interrupted sixty times a minute, was passed for four minutes, and then a continuous current for three minutes; the interruption caused marked contractions of the leg muscles. On the 23d, with patient etherized, the current from twenty cells, with interruptions of thirty to the minute, was passed for four minutes, and then continuously for three minutes. On the 28th, as there was but little change in the tumor or the severity of the pain, the patient was again etherized, and a current from *forty* cells—interruptions sixty to the minute—passed for four minutes, and then the continuous current of the same strength for five minutes. The contractions of the leg and abdominal muscles were very energetic when the current was interrupted. The pains gradually improved after this application of galvanism; the temperature remained normal after May 1st; menstruation appeared May 18th; on September 15th, there was still occasional pain, but the patient had gained decidedly in flesh and strength, and though the tumor was still found, it was much smaller, less tense, and less painful on pressure.

While this case is of a somewhat doubtful nature, it is interesting, on account of the unusually powerful electrical currents employed, they being very much stronger than is usually considered necessary or safe.

[2] CASE XVI.—DR. THOMAS. Abdominal pregnancy; fourth month. January 23d, 1884. Galvanic current, one electrode in rectum, other on abdomen. Seventeen cells—interruption sixty to the minute—for two minutes. Rest of a minute. Then seventeen cells—interrupted—for two minutes. 26th. Twenty cells—interrupted—for two minutes. Rest of a minute, then twenty cells—continuous—for two minutes. 28th. Fourteen cells—interrupted—for three minutes; same—continuous—for three minutes. 29th. Twenty cells—interrupted—for two minutes; same—continuous—for two minutes; same—interrupted—for two minutes.

The results of the electrical treatment were truly remarkable; at the end of forty-eight hours the unpleasant symptoms began rapidly to diminish; at the end of ten days she returned home, though at great risk; at the end of a month resumed, very gradually, her usual avocations, and finally completely recovered: a small, hard nodule, about the size of a hen's egg remaining to mark the site of the large tumor which had occupied Douglas' pouch.

[3] CASE XVII.—DR. BRIGGS. DR. M. D. MANN in consultation. Left tubal pregnancy; end of third month. Electrical treatment begun May 21st. Faradic current,

[1] *Trans. Am. Gyn. Soc.*, 1884, p. 172. [2] *Trans. Am. Gyn. Soc.*, 1884, p. 174.
[3] *Med. News*, Phila., July 11th, 1885, p. 31.

Fig. 1.

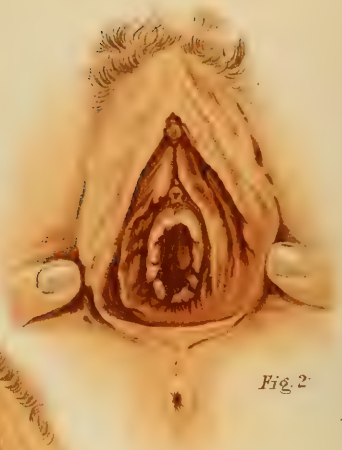


Fig. 2.

Fig. 5

Fig. 3

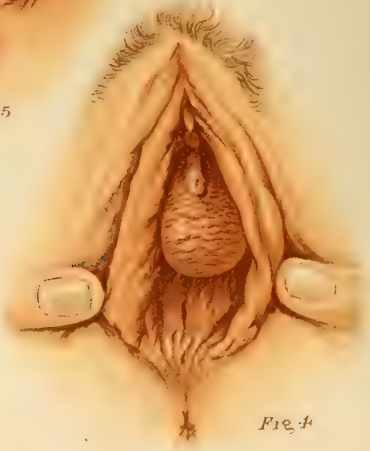


Fig. 4

PLATE XII.

Figures drawn from life.

FIG. 1.

External genitals of virgin (the shape and consistency of the hymen vary greatly ; the present may be considered the one most commonly seèn).

FIG. 2.

External genitals of nulliparous woman, showing the hymen torn but not destroyed.

FIG. 3.

External genitals of parous female (one who has borne one or more children), showing destruction of hymen and fourchette, as caused by the passage of the child.

FIG. 4.

External genitals of parous woman, showing prolapse of anterior vaginal wall (cystocele) and laceration of the perineum.

FIG. 5.

External genitals of parous woman, showing prolapse of posterior vaginal wall (rectocele), with moderate laceration of perineum.

one pole in vagina, other on abdomen over tumor; current gradually increased to limit of endurance. On the 22d, fœtal motion was distinctly felt by the patient during the treatment. On the 23d, this motion had disappeared. On the 26th, soreness was gone, and pain on direct pressure over the tumor was much less. On the 28th, soreness and pain on pressure all gone, patient dressed and up for the first time in weeks. Tumor had now diminished very perceptibly, and breasts had become shrunken and flabby, these changes having begun after the first application of the current. On the 2d of June the current was used for the thirteenth and last time. The tumor could now be felt only with great difficulty externally; while an examination per vaginam showed it to be very much smaller and closely attached to the left horn of the uterus. The patient was now free from pain, and declared that she felt as well as she ever did. On the 16th, she left the city for home.

[1] Case XVIII.—Dr. E. V. Stoddard. Dr. M. D. Mann in consultation. Left tubal pregnancy; third month. The symptoms being very threatening, all preparations were made for laparotomy, but as a previous expedient it was determined to try electricity. With an electrode passed into the vagina and carried to the junction of the enlarged tube with the uterus, and a sponge electrode placed externally, a rapidly interrupted current, from five cells, with a long coil of fine copper wire, was passed through the tumor for ten minutes. During the next two days no attack of pain occurred, and a slight hemorrhage which had been present ceased. The electricity was repeated twice, at intervals of two days, the symptoms all ceasing after its first application. Normal menstruation the last of October, and again in four weeks. The tumor was then found to be very greatly reduced in size, the only trace being some thickening of the tube.

XI.

OBSTETRIC AND GYNECIC JURISPRUDENCE.

The questions of Medical Jurisprudence in its connection with obstetric and gynecological practice are far too many, and of too complex a nature, to be studied in full in the limited space here allotted to them; but, as the subject is one full of interest and value to every physician, an endeavor has been made to present concisely some of its most important subjects, giving, especially, those which would be most useful to any who might become involved in the meshes of law or be compelled to testify, on the witness-stand, on the obligations existing between physician and patient, or of the medico-legal aspects of paternity, legitimacy, pregnancy, live-birth, infanticide, abortion, and rape.

Duties of a Medical Witness.

When called upon to testify as a witness before a court of law, the physician should remember the weight which his statements may carry, and the influence which his evidence and the manner of delivering it may have, not only upon the opinion of the jury, but upon his own professional reputation.

[1] *Med. News*, Phila., July 11th, 1885, p. 31.

He should be completely and thoroughly prepared upon all parts of the subjects on which he may be called upon to give evidence. His demeanor should be that of an educated man, and suited to the seriousness of the occasion. He should keep his temper, no matter how exasperating the questions or manner of the examining counsel may be, for nothing tends more to destroy the weight of his evidence than any manifestations of flippancy or anger. He should use no more technical words than are absolutely necessary, but put his statements in the plainest and simplest terms. He should put no statements into a medical report which are not *strictly* within the subject of inquiry, from a medical or surgical point of view. His answers should be direct, concise, distinct, and audible; strictly confined to the terms of the question, and neither exaggerated nor minimized. If he entertains doubt about the matter at issue, let him express his doubts frankly, and thus save himself the mortification of having them extorted from him by an unpleasant cross-examination.

While the witness himself should never try to appear learned by using quotations from medical authors, yet when such are referred to by the questioning counsel, he should be on his guard that the passage is correctly quoted and understood, and, should always make sure, by referring to the work itself, that it is rightly quoted and understood. Written notes in evidence are valuable, though they can be used by the witness only for the purpose of "refreshing his memory." To be admissible they must be taken at the time of the observation, or as soon after as possible; they must be the original notes, and not a copy, and must not be changed by additions, interpolations, or erasures.

While in England the highest legal authorities have decided that medical men have no special privilege with regard to secrets of a professional nature, it has been decided in New York that "no person duly authorized to practice physic or surgery shall be allowed or compelled to disclose any information which he may have acquired in attending any patient in his professional character, and which information was necessary to enable him to prescribe for such patient as a physician, or to do any act for him as a surgeon."[1]

In complicated and important cases, medical men may be called upon who, by reason of special experience in certain branches, may be considered as *experts* in those branches, and therefore, presumably, be able to guide the court to a proper understanding of the facts of the case. An expert is usually called to give an opinion on certain facts already laid before the court by other witnesses, and must give his opinion on these facts as proved, he having no right to dispute them. He should give his *honest* opinion in a straightforward and impartial manner, and not allow himself to be influenced by the counsel of either side. A strict adherence to this rule

[1] Formerly, at common law the privileged communication was that between lawyer and client; this was considered sacred, common law being to a large extent opposed to Roman Catholicism. The confessional was opposed and the relation of priest and communicant was not regarded as privileged, as in the Catholic States of Europe. Afterwards, in common law the privilege was extended to physician and patient. The tendency has been to extend this privilege to other confidential relations, and to-day, in many jurisprudences, it covers lawyer and client, physician and patient, priest and communicant, and apothecary and customer.

would do much to remove the discredit which has fallen on *expert testimony*. As no expert witness can be compelled to give his *opinions* to the court, he is, therefore, not bound to accept a subpœna calling merely for his opinions, though if any fact relating to the case be within his personal knowledge, a subpœna served on him to speak on that fact is as imperative as when served on any other witness.

During the *examination in chief* the attorney tries to bring out the facts which are within the knowledge of the witness, by *questions which do not suggest their answers*, the only exception in which *leading* questions are allowed being when the witness is evidently unwilling, or "hostile," that is, when he is compelled to testify to certain facts which he has an object in concealing. In the *cross-examination*, the counsel on the opposite side—to whom great liberty is rightly allowed in the matter—endeavors, by *questions which may lead to their answers in the strongest form*, to detect any inconsistencies, flaws, or omissions in the testimony of the witness, and to cause it to appear in the light most favorable, or least damaging, to the side of the case they advocate. It is especially in the cross-examination that the strength or weakness of a witness manifests itself.

In *re-examination*, when a good examiner takes care to clear up any obscurities which there may be in the evidence of his witness, questions can only be asked the witness on subjects about which he has been cross-examined, or which arise from the cross-examination, and, if by permission of the court, new matter be introduced, it is always open to further cross-examination. The judge may ask the witness questions which may seem to him necessary to secure the ends of justice.

It is always well for a medical or scientific witness to make arrangements concerning the payment of his customary fees before being sworn to deliver his evidence, as otherwise he may be able to claim only the *legal* witness fees, which would not at all recompense him for his time and trouble.

Relations between Physician and Patient.

The law supposes that every practitioner shall use an ordinary degree of care and ability in the pursuance of his profession, and holds him liable for any gross carelessness or want of skill.[1]

[1] Brooks v. Clark, 57 Texas, 105. A physician attending a woman in labor, immediately after the birth of the child, and before its removal from the bed, tied two ligatures around the umbilical cord. The next morning it was discovered that it had ligated the child's penis, so that the resulting slough removed the head nearly the entire size. In a suit by the child for damages, the court refused to instruct the jury that they could award exemplary damages, if they should find that the injury was the result of malice, or was wanton, but they were instructed to find only actual damages, if they found that the injury was the result of a want of ordinary care and diligence. The jury were only allowed to find exemplary damages when they found "that it was conduct in that occasion deficient, shows such reckless want of care as to evince that he was probably conscious of the probable consequences that carelessness and inefficiency of the character which plaintiff was subjected."

The court held that a verdict of fifty-five hundred Seven dollars damages suffered [illegible] to be excessive as being exemplary.

That while actual damages include mental suffering through life, there must exist [illegible] for damages on the ground of being excessive.

That when the act is so grossly negligent as to raise the presumption of malice [illegible] that on the

While a physician is liable for injury caused by *omission*, as well as *commission*, errors in judgment are not considered malpractice in themselves when the party has not otherwise offended by negligence or rash experiments.

On making a promise to attend a woman when notified that she shall be in labor, he can be held liable for breach of contract, but not for personal injury or suffering, if, because of his willful neglect to fulfill his promise harm comes to the woman.[1]

If when attending a case of labor he, for some reason other than danger to his life, leaves the woman before delivery is completed, and before the arrival of another physician, he may be held liable for damage if the woman suffer from want of help, and for manslaughter if the patient dies in consequence of this neglect.[2]

He can also be held liable if, in the exercise of his profession, he unnecessarily takes a non-professional person into the presence of a patient—the patient supposing such person to be a medical man.[3]

On the other hand, he can collect his fee if, after contracting with a patient to attend her in labor, she, without notice and unnecessarily, neglects him, by calling in some other physician.

Legitimacy and Paternity.

A child born before wedlock is illegitimate, although the parents afterwards marry.

Every child born in wedlock, even though its conception may have occurred before marriage, is regarded as legitimate—that is, to have the mother's husband for its father—unless impossibility of intercourse be proved.

Non-access cannot be proved by husband or wife, but must be determined, by other evidence.

matters connected therewith, defendant has shown due care, and that actual indifference would have been indifference to his own interests, should not be allowed for any other purpose than to be considered by the jury in fixing the amount of exemplary damages. If they did not believe his conduct was such, they were to give compensatory damages.

[1] Hunter *v.* Ogden, 1 Queen's Bench, 132.

[2] Braxton Hicks, *Lond. Lancet*, Aug. 1st, 1885. A physician was tried for manslaughter, on account of having deserted a woman in labor, whom he had been called to attend, because of abusive language employed by the husband toward him. Other medical assistance was obtained after a time, but the labor was a difficult one, the woman subsequently dying of puerperal fever. The physician was acquitted, since it could not be proved that the same result might not have followed had he remained with the patient, but it was *strongly* laid down by the judge that a medical man should on no account leave a woman in labor, except his life was in peril; that he should tell them to get another attendant and not leave until the arrival of the other; otherwise, should the woman suffer from want of help he would be held responsible for it.

[3] Demay *v.* Roberts, 46 Michigan, 160. A physician took a non-professional, unmarried man with him to attend a case of confinement, where there was no emergency requiring the stranger's presence, telling the patient's husband that he had brought a friend with him to help carry his things, who was accordingly admitted, and held the patient's hand during a paroxysm of pain, the attendant having retired temporarily, on account of having received from his patient a kick in the pit of his stomach. The patient, on afterwards discovering the facts, sued both in damages. The court held, that the plaintiff and her husband had a right to presume that the outsider was a medical associate, and that, in obtaining admission without disclosing his true character, the defendants were guilty of deceit: that the plaintiff had a right to testify that she supposed he was a physician or medical student, and also to give evidence of whatever may have been said at the time tending to support such supposition; that damages may lie for an injury done when its full extent is discovered, though long after the act from which it springs.

If a husband have access to his wife (*i. e.*, if they cohabit), or if there exist between them the slightest possible description of intercourse, all children born of her are regarded as children of her lawful husband, and that although the woman be living in adultery at the time. On the other hand if husband and wife live separately, she living in adultery during the period of such separation, the legitimacy of children born to her under such circumstances cannot be maintained.

A posthumous child is considered legitimate, unless non-access, or impotence or sterility on the part of the husband can be proved.

Interesting and important questions, involving medical points relating to disputed paternity often arise, some of which require a medico-legal expert to expound, though more may be answered by any one who possesses a moderate knowledge of the causes and effects of impotence and sterility, and of the norm and the limits in the duration of pregnancy.

A knowledge of these subjects may also be important in questions relating to Rape or Bastardy, or where dissolution of marriage is sought on the ground of impotency.

Impotence and Sterility.—These are terms which, though definite and widely different in meaning, have been often used as if nearly synonymous, many seeming to forget that *impotence* means only inaptitude for coition, and *sterility* inability to procreate or conceive. Thus, a male having no penis, or no power of erection, or a female having no vagina, would be impotent; while a man whose semen contained no zöosperms, or a female with no ovaries, would be sterile. Impotency may depend on physical or moral causes, the latter not concerning the medical jurist.

While instances are on record of precocious youngsters attempting copulation at as early an age as four years, the male does not become fertile until some little time after the advent of puberty; for though emissions may then occur, the semen does not yet contain spermatozoa. I know of no case where a boy has become a father under fourteen years of age, and instances of such early paternity are rare. On the other hand, spermatozoa, and the possibility of fruitful intercourse may exist in very old men, though instances of their absence become progressively more numerous after the age of sixty-five.

Sterility or impotence, one or both, may arise from many pathological causes, conditions, or states. With an extreme degree of epi- or hypospadias, where the orifice of the urethra is so placed as not to come in contact with any part of the vaginal canal during copulation, a man would be, probably, both impotent and virtually sterile, *though not surely so*, as conception has occurred where semen has been only deposited upon the vulva. The entire absence of a penis, therefore, while it would render the individual impotent, would not, necessarily, cause sterility. Amputation of the penis, unless so close that there is no protrusion during excitement, does not always render a man impotent. Most hermaphrodites are sterile, and very many impotent.

In the exceedingly rare cases of congenital absence of one testicle, the other has generally been well formed and normal. Where one testicle has not descended into the scrotum, the individual is often sterile, and where both remain undescended, almost invariably so, although the physical development is generally manly and complete. After castration, if any of the secreting tubes of a testis remain, the man may remain fertile.

Where there is congenital absence or non-development of testicles, or where they have been removed in infancy, the individual is always languid, slenderly formed, though usually fat, with little hair on the face and pubes, with undeveloped genitals, and weak, falsetto voice. If the testes be removed after puberty, the masculine character is generally retained, only rarely becoming womanish.

Excessive masturbation may cause both impotence and sterility.

Advanced disease of the penis or testes, cancer, syphilis, etc., or tubercular deposits, congenital malformations, double epididymitis from gonorrhœa, or wounds from lateral lithotomy, by causing occlusion of the secretory ducts; or urethral stricture, by causing the semen to flow into the bladder, may all produce sterility.

Extreme physical weakness, resulting from disease of any kind, notably decreases sexual power, and often induces both impotence and sterility, as do also the excessive use of alcohol, opium, or tobacco. Many other drugs may produce the same effects temporarily.

In examining a man supposed to be impotent, if the genitals are well developed and healthy, and the general health and condition good, we assume, within the usual limits of age, that there is capacity for sexual intercourse. If after examination we remain in doubt, we should not hesitate to admit it.

Impotence in the *female* is more limited than in man, it sufficing for coitus that the vagina be sufficiently patent to receive the penis and permit copulation. This may be prevented by adhesions of the labia (always accidental); by excessive length of the nymphæ, or by their enlargement, the result of elephantiasis or syphilis; by the condition known as transverse female hermaphrodism; by total absence of the vagina, or its defective formation, either by congenital narrowness (rare), or by bifidity, where neither canal will permit of copulation, or imperforate hymen, or membranous occlusion of its lower part; by abnormal orifices from the vagina into the rectum, bladder, or urethra; by vaginismus.

The length of the period of possible fertility in women is usually the same as that of their menstrual life, though it may happen occasionally that a woman conceives before the oncoming of menstruation or after its cessation. Ovulation is the best proof of aptitude for procreation. It is evident that those conditions producing impotence in the female will necessarily cause sterility, actual or virtual. Sterility may be caused by any factor which prevents or hinders the introduction of spermatozoa into the body of the uterus; thus an unusual difference in the length of the anterior and posterior vaginal walls, a faulty insertion of the uterus into the vagina, a marked in-

crease in the size and flabbiness of that canal, or any condition which tends to produce a copulative sac which diverts the semen from the uterine axis, may produce this condition. Also congenital or acquired contractions of the cervical canal, a long and conical vaginal portion of the cervix, deep lacerations or hypertrophy of this part, or any alteration of its structure, well marked versions, especially where the displacement is kept up by adhesions, very acid vaginal secretions, tenacious mucus in the cervix, the various inflammations of the tubes, or their constriction or compression by the products of inflammation, defective development of the uterus, disease or absence of the ovaries.

Little difficulty is usually found in forming a conclusion concerning the aptitude of a woman for coition. In examination especial notice should be taken of the development of the external genitals and breasts, of unusual tenderness or irritability of the genitals, or of any hysterical manifestations which might render copulation difficult, of the character and condition of the hymen, of the dilatability and size of the vagina, and of any abnormality.

When called to testify as to the fertile or sterile condition of a woman, we must frame our opinions in the most guarded manner, clearly stating the difficulties of a definite answer to the court, for, though many conditions may exist which usually cause barrenness, a woman may conceive when nearly all the above causes of sterility are present. While inaptitude for conception may often be inferentially stated, nothing short of complete closure of vagina, or absence of uterus and ovaries will insure an absolute assertion of sterility. At a necropsy we may be able to reach conclusions which, during life, were impossible. It should be stated that women have conceived after double ovariotomy; in these cases there must have been a third ovary, of which there are several undoubted cases on record, or one ovary must have been imperfectly removed, some ovarian tissue being left behind.

Limits of Duration of Pregnancy.—While most physicians, and usually with a fair degree of correctness, calculate the time of labor as a certain period from the cessation of the catamenia, it can easily be shown how liable this method is to error; for it is well known that conception can take place during any part of the intermenstrual period, thus allowing a latitude which may be as great as four weeks; again, it may sometimes happen that menstruation, or a flow simulating it, may occur for one or more periods after conception has taken place, or conversely, that it may be absent before impregnation has occurred. Even in the rare cases, where gravidity can be dated from a single coitus, there creeps in a source of error, for, though we know when insemination occurs, we cannot tell as the vital cells may remain alive in the maternal passages for days when impregnation is accomplished.

As it is thus impossible to definitely fix the time of impregnation, so is it impossible to state the exact duration of a normal pregnancy. Indeed, there is strong reason to doubt that the time is an exact one, it probably differing

slightly in different women, and even in the same woman in different pregnancies; that, however, its average duration is about 270 to 280 days is the accepted belief.

As impregnation is most usual immediately after the cessation of a menstrual period, a calculation of the time of labor, counting 280 days from this date, is usually approximately correct, yet it must be remembered, as I have stated above, that impregnation may occur at other times, and that from a medico-legal standpoint exceptional cases are the most important.

The determination of the earliest period at which a child may be born and be capable of living for the ordinary period of human existence, the period of viability, is sometimes a matter of grave importance, affecting, not only the legitimacy of children—as, when a child is born soon after marriage, or when the husband has had access to his wife for a limited time only—but the honor of parents and the peace of families.

The two points usually requiring the attention of the medical jurist in questions of this nature are: *Is a child of the age stated or estimated viable, and, granting it to be alive when born, is it probable that it could be reared?*

The practical conclusions which Tidy[1] draws from a large amount of evidence are as follows:—

1. "Allowing that from the first moment of impregnation the ovum is truly alive; and, further, that mere motion of limbs, or evidence of circulation, without active respiration, are sufficient to constitute live-birth, nevertheless, there is no evidence to show that a fœtus born at an earlier period than between the fourth and fifth month of uterine existence, can, in any sense, be said to be born alive, much less lead an independent life, *i. e.*, a life apart from its mother.

2. "That living children have been born between the fourth and fifth months of uterine life. There being, however, no well authenticated case where less than a five months child has lived beyond twenty-four hours after its birth, and but one where it has lived for twenty-four hours.

3. "That children born alive at the fifth and between the fifth and sixth months of utero-gestation mostly die after a few hours, yet there are a limited number of recorded cases, where such children have been reared, and have even reached adult age.

4. "That several well authenticated cases exist where children born between the sixth and seventh months, and even at the sixth month, have reached adult age, but that in such cases more than ordinary care and attention have been needed to maintain life, at least for some time after birth.

5. "That in all cases of early birth, beyond the facts indicated by well authenticated records, the question of the character of the parents, the conditions of the accouchement—such as its concealment and certain other general considerations—must, of necessity, constitute important evidence on which a jury should rely to decide the question of legitimacy."

As a learned obstetrician has said: "Take care not to be deceived. I

[1] Legal Medicine. Tidy, N. Y., 1884, vol. iii, p. 31.

have known many remarkable cases of fully developed and mature children being born within seven months of marriage. They are commonly regarded as marvels, but, in my experience, they are marvels limited to first pregnancies!"

In all cases of this kind, we must take care to ascertain whether the appearances shown by the child at birth correspond or not with its alleged shortened term of intra-uterine existence. Some of the most important signs showing the approximate period of development are, briefly, as follows:[1] At *term* (ninth month) the fœtus presents a certain general appearance of maturity which is familiar to experts; the skin is paler than when less mature; the down (lanugo), to a great extent, has disappeared; the white points caused by dilatation of the sebaceous follicles, found in many cases, on the chin, under lip, nose, cheeks, and forehead, diminish in proportion to the maturity of the fœtus, at term being found only on tip of nose; the pupillary membrane has disappeared; there is more or less hair, of a length of from nine to twelve lines, on the head; the nails reach the ends of the fingers; the cartilages of ears and nose feel cartilaginous; the testicles will probably be in the scrotum, and the scrotum itself will be corrugated; the labia majora usually nearly cover the nymphæ and clitoris; the length is from seventeen to twenty-one inches; the weight five to nine pounds.

At *eight* months: Length, fourteen to sixteen inches; weight, four to five pounds; vernix caseosa all over skin; nails reach extremities of fingers; membrana pupillaris becomes invisible during the month; testicles descend into internal ring; the middle point is nearer the umbilicus than the sternum.

At *seven* months: Length, thirteen to fifteen inches; weight, three to four pounds; skin rosy, thick and fibrous; sebaceous covering appears; nails do not yet reach extremities of fingers; eyelids no longer adherent; membrana pupillaris faint; a point of ossification in the astragalus; meconium occupies nearly the whole of the large intestine; left lobe of liver nearly as large as the right; gall-bladder contains bile; middle point a little below end of sternum.

At *six* months: Length, nine to ten inches; weight, one pound; skin presents some appearance of fibrous structure; eyelids agglutinated; membrana pupillaris present; sacculi begin to appear in the colon; funis inserted a little above pubis; face of a purplish red; hair white or silvery; vernix caseosa begins to appear; liver dark red; gall-bladder contains serous fluid destitute of bitterness; testes near kidneys; middle point at lower end of sternum; points of ossification in four divisions of sternum.

More of the questions involving legitimacy, or the chastity of females turn upon *protracted* than upon *premature* delivery. While we have very strong and reliable evidence that pregnancy *may* be protracted to a period between 280 and 325 days, we have no *absolute* evidence that this is so. These cases

[1] Adapted from Tidy, whose work [illegible]

are generally decided as much from the moral evidence as from the medical, it being conceded that such prolonged periods of gestation are possible. Individual experience is here of little value, it being important to consider all recorded instances, and to gauge their actual worth.

Affiliation.—May sometimes be settled by likeness to supposed father, not only in features, but in voice, gesture, attitude, action, color, and other characteristics, the evidence, from the nature of the case, being necessarily circumstantial.

Pregnancy.—Where it becomes necessary, for legal purposes, to determine the existence or non-existence of gravidity, it is requisite that the physician proceed with great caution and thoroughness, and with assistance from a colleague; that where important questions are involved, the examination should be made in the presence of a witness; that no reliance be placed upon the statements or fancies of the woman or her friends, but on the *physical signs only;* that one single symptom should never be relied upon as proof of gravidity, it being necessary that several marked signs should be undoubtedly present; that he should remember that a medical man is not justified in examining a woman *without her full consent*—given in the presence of witnesses—except in the case of a prisoner under a written order from the court, and that examination under other circumstances may render him liable for damages, or even be construed as an assault.

The signs and symptoms of pregnancy (p. 237), and the methods of examination (p. 1098) having already been given, it is not necessary to repeat them here.

Feigned pregnancy may always be detected by a well informed physician, for women always feign *advanced* pregnancy. Examination should be insisted upon.

Concealment of pregnancy during its whole term is a punishable offense, if the child of which the woman is delivered be found dead or be missing, on the principle that its death was due to want of proper care.

A woman may be in even an advanced stage of pregnancy without knowing or even suspecting it, but such cases are rare, and must always be looked upon with suspicion. On the other hand, she may consider herself pregnant when not so.

Pregnancy may require to be verified *after death*, to determine identity, or to prove or disprove charges of unchastity. Proof here rests upon discovery of traces of the ovum. It should be remembered that the *unimpregnated* uterus undergoes decomposition much more slowly than other organs, often remaining firm and hard for many months.

Delivery.—The determination of *delivery* is much more important in many ways than that of pregnancy, especially in *concealment of birth, abortion, infanticide, questions of suppositious children*, etc.

Pregnancy may have been concealed, and admission of delivery may be criminating; in such cases the medical examiner has no right to extort confession.

The proofs of delivery are almost *nil* after two or three months. The woman may show the effects of hemorrhage, but this is not proof; after three months the os may be patulous; there *may* be some lochial discharge, and we *may* find in the uterus shreds of placental tissue. Twenty-four or thirty-six hours after an abortion, we may find no *positive* traces of the delivery.

Signs of Recent Delivery in the Living:—

General weakness and indisposition; paleness of face; dark circles around the eyes; *all these symptoms suddenly appearing*, though they may occur after any severe illness, are suspicious.

The breasts are full after three or four days; nipples enlarged; marked areola. Skin of abdomen relaxed, may lie in folds or wrinkles. Striæ albicantes. Uterus may be easily felt through the abdominal wall, reaching above the pubes. Pigmentation of linea centralis from pubes to navel.

Generative passages swollen, contused, lacerated, dilated, may contain clots of blood; os uteri dilated, cervix may be lacerated; lochia present.

These signs are only found shortly after delivery. Vigorous and strong women, especially multiparæ, may resume the natural state in a few days. The signs commonly disappear after ten to fourteen days, so that we may then be unable to say positively that the woman has been recently delivered. The earlier the examination is made the more satisfactory will it be. Microscopic examination of the lochia may reveal chorionic villi in early abortion.

Signs of remote delivery may be required in cases of contested legitimacy, where it is charged that a child has been substituted which the woman claims as her own, or in infanticide several months before the examination: lacerations or fissures of the cervix uteri; destruction and obliteration of the hymen and traces of laceration at the posterior vulval commissure are the most reliable signs.

Feigned delivery, for purposes of extorting charity, compelling marriage, or disinheriting parties, is usually easily detected and disproved, because the woman feigns *recent* delivery. It is necessary in these cases to proceed at once, and with great caution, to make a *careful* examination of the person, to examine and see that the placenta is *genuine*; to examine the child and observe whether its appearance corresponds with the period of the alleged labor.

I feel it my duty to call particular attention to the signs of parity and nulliparity, because attempts are not unfrequently made by patients to deceive the physician as to the previous occurrence of conception. The presence of a hymen which, although torn in one or more directions, still can be restored to its apparent integrity, will generally show that nothing more than coition has taken place, except, perhaps, an early abortion; but, if the

posterior circumference of the hymen is absent, and the fourchette torn, that is, the navicular fossa obliterated, the chances are greatly in favor of the distention of the vaginal orifice by a large body, like the head of a full grown child. Of course, rare exceptions to either condition may occur, and it is well not to be too positive in making a statement.

Unconscious delivery—in questions of infanticide—undoubtedly may take place, though *rarely*, except when the woman is comatose, or strongly under the influence of some narcotic poison, chloroform, ether or alcohol, or puerperal convulsions. A multiparæ may drop her child in the water-closet and be unconscious of its birth, or be unable to stir until too late to save it.

Post-mortem delivery may take place, and the uterus expel its contents even when there have been no symptoms of labor before death, this effect being caused by contractile power remaining in the uterus after the rest of the body is dead, or by the pressure of the gases of putrefaction.

Signs of Delivery in the Dead Body :—

Examinations of this nature are almost invariably confined to the investigation of criminal abortion. When death has occurred within three to five days after delivery, satisfactory proofs can be obtained post-mortem; when after several weeks, detection may be difficult or impossible.

At *full term* an examination soon after delivery reveals the uterus as a flabby, flattened pouch, nine to twelve inches long, and one to one and a half inches thick; its cavity may contain blood clots, or shreds of membrane or placenta, and its inner surface shows the remains of the decidua. The section of its wall shows many vessels. The placental site is dark, gangrenous looking, and shows many semilunar or valvular openings of venous sinuses. The uterine adnexa are congested and purplish. The os uteri is patulous and ecchymotic. The genital passages may show unhealed lacerations and ecchymotic spots. The corpora lutea, upon which so much importance was formerly placed, have been found to be unreliable as signs of recent delivery, and need not here be discussed.

At earlier periods of pregnancy we would find these same signs, though less in degree; evidences that the uterus had been exposed to violence, as perforations or lacerations, should always be noted.

The difficulty of finding satisfactory proof of recent delivery increases inversely to the duration of the pregnancy, and in the early months, though we may be morally sure that an abortion has occurred, it may be impossible to swear that the same appearances that we find could not be produced by other causes than the growth and discharge of an ovum.

Live Birth.

Was the child born alive or dead? is the question of first importance in criminal cases involving charges of infanticide and concealment of birth, and

in civil cases involving "tenancy by courtesy;"[1] further, a fœtus in utero, "en ventre la mere," may have a legacy or estate made over to it, may have a guardian assigned to it, may claim damages, may be appointed an executor; though none of these conditions take effect unless the child be born alive.

Date of Birth.—As evidence is frequently demanded in the courts respecting the date of birth, it is important for the obstetrician to keep a reliable record of births, and to be careful in noting the *exact* time at which the child is born, remembering that the child is not *legally* born until *the whole of its body has come entirely into the world.*

Concealment of Birth.—"If any woman shall be delivered of a child, *every person* who shall by any secret disposition of the dead body of the said child, whether such child died before, at, or after its birth, endeavor to conceal the birth thereof, shall be guilty of a misdemeanor."

Signs of Life or Death manifested immediately after Delivery.[2]—While visible respiration of a child, or its manifestation by crying, is an undoubted sign of its having been born alive, it is not necessary to establish the fact of live birth, it being sufficient, for the child to acquire its civil rights, that it manifest any reliable sign of vitality, as movement (muscular contraction), pulsation of the cord, or beating of the heart. It is necessary that the sign of vitality be shown after the child is completely born; thus, though the child should cry and move vigorously while the body was still in the maternal passages, but show no sign of vitality when completely born, it would be accounted a still-birth.

The signs of the child's *death*, which should be noted at the time of delivery, are the absence of muscular or respiratory movements, of funic pulsation, of beating of the heart, and, when the child has been dead for some little time, the appearance of maceration or putrefaction.

The Evidences of Live or Still Birth as furnished by the Autopsy.—Notes of the conditions found should be made on the spot, and should embrace the following particulars:[3]—

I. External Examination.

1. Everything relating to the external appearance of the body, its shape, position, conformation, condition as regards putrefaction, spots, marks, ecchymoses, etc.

[1] Blackst. L. Dec., lib. i, cap. i. The estate to which he was entitled [illegible] the death of [illegible] [illegible] [illegible] certain persons they have had [illegible] [illegible] [illegible] estate. It is a settled [illegible] [illegible] places [illegible]

[2] [illegible]

2. Its size: including not merely the length of the body, but the dimensions of the head and thorax.
3. Its weight.
4. The condition of the navel and the umbilical cord.

II. Internal Examination.

1. *The condition of the respiratory organs.*
   (*a*) The dimensions and shape of the thorax.
   (*b*) The situation of the diaphragm.
   (*c*) The color, volume, shape, situation, consistency, density, absolute weight, and specific weight of the lungs.
2. *The condition of the organs of circulation.*
   (*a*) The condition of the heart and its cavities.
   (*b*) The foramen ovale.
   (*c*) The ductus arteriosus, its dimensions and shape.
   (*d*) The ductus venosus.
   (*e*) The state of the umbilical vessels.
3. *The condition of the abdominal organs.*
   (*a*) The liver, its weight and size.
   (*b*) The stomach and intestine. The presence or absence of air, food, medicine, meconium, etc.
   (*c*) The state of the urinary bladder and kidneys (uric acid infarction).
4. *The condition of the brain and spinal marrow.* The cranium should be examined for fractures, punctures, etc.

While, in many instances, it is easy to prove that a child was born alive and lived for a variable time; in other cases, it may be difficult or impossible to say whether the child was born alive or not.

For instance, if the child, though born alive, was suffocated, purposely or accidentally, before it had breathed, we probably would not be able to find at a post-mortem examination any satisfactory proof that life had existed, and yet we could not say that it had not. Marks of violence might afford uncertain proof. The only conditions which would afford certain proof of ante-natal death, would be those of intra-uterine putrefaction or maceration, and these may, in exceptional circumstances, as where the body has lain, protected from light, in warm sea water, be closely simulated.

Intra-uterine putrefaction is characterized by marked flaccidity of the body, so that it flattens out by its own weight and appears ready to fall to pieces, by a coppery-red color of the skin without a shade of green about it, by peeling of the cuticle, and by a penetrating, peculiarly sweetish, stale and unendurable stench. Maceration differs from putrefaction in that it occurs when air does not gain access to the fœtus; we here get the same peculiar softness and flabbiness of the body, but the stench is absent, and the coloration much less marked.

Some of the most important means of determining whether the child was born alive are as follows:—

1. *The Hydrostatic Test*,[1] for determining whether the lungs have been naturally inflated or not, *i.e.*, whether the child has breathed.

(*a*) "Remove the lungs and heart together, by knife, from the thorax, securing in the first instance the larger vessels, to prevent escape of blood.

(*b*) "Place them entire in a pailful of water (rain water being employed by preference), at 15° C. (60° F.), and note if the lungs float and are able to buoy up the heart with them; in other words, if the thoracic viscera float as a whole. Should they sink, note whether they do so slowly or rapidly, and whether they sink completely to the bottom of the pail, or a short distance only below the surface of the water.

(*c*) "Test each lung separately in a similar manner, and note whether both lungs float or sink, or if one sinks while the other floats.

(*d*) "Cut each lung into from 15 to 20 pieces, preserving the positions of the several pieces, and note whether the separate portions sink or float.

(*e*) "Wrap the several portions that float, separately, in a coarse cloth, place them on the floor, and cover them with a piece of board. Stand on the board (avoiding any jerking movement), so as to apply a regular and even pressure to the several portions. This done, again determine whether the several pieces sink or float in water."

The two general conclusions to be drawn from the hydrostatic test may be broadly stated as follows:—

(1) "If the lungs float whole and are able to buoy up the heart with them, and if they also float when cut into small pieces, but more especially if the bouyancy of the several pieces continues after the application of pressure, there is strong presumptive evidence that the child has breathed, and therefore has lived; but this does not prove that the child was born alive in the legal sense, that is, that it drew air into its lungs *after* it was *completely* external to the mother.

(2) "If the lungs sink in water whole and after being cut into pieces, there is strong presumptive evidence that the child has not breathed; but this does not necessarily prove that the child was born dead.

"In stating the conclusions to be drawn from the hydrostatic test, it will be noted that life and breathing are not regarded as convertible terms, the fact being that this test is not a test of live birth, but of respiration only. Respiration, in law, is not an exclusive proof of live birth. No doubt, physiologically, a child that has breathed has lived, but it does not follow that a child that has not breathed has not lived."

Lungs which have not breathed are dark in color—blue-black, maroon or purple—resembling liver; the air vesicles are not visible to the naked eye; they do not crepitate when squeezed or cut; they contain but little blood and that is not frothy unless there is putrefaction; they sink in water unless putrid, and often even then; bubbles of gas arising from putrefaction may be squeezed out, and as they escape are usually noted to be of large size.

[1] Taylor, *loc. cit.*, vol. III, p. 164.

Lungs which have breathed are light in color—rose-pink, pale-pink, light red, or crimson—mottled, and with air vesicles distinctly visible to the naked eye, or to a lens of very low power; they crepitate freely, and contain a good deal of frothy blood; they float in water, or at all events the parts which have breathed float, and the air cannot be squeezed out.

Where the *lungs have been artificially inflated*—a difficult procedure while they remain in situ—we observe, according to Casper, "a sound of crepitation without any escape of bloody froth on incision, *laceration* of the pulmonary cells with hyperæmia, *bright cinnabar red* color of the lungs *without any marbling*, and, perhaps, air in the (artificially inflated) stomach and intestines."

The Appearance of the Funis and Umbilicus.—Soon after the cord has been ligated it begins to shrink and dry up, so that, usually by the end of the third, though sometimes as early as the first or as late as the fifth day, it becomes completely *desiccated*, brown, flat, parchmenty, and translucent. These changes do not take place at all, or but to a slight extent, if the child is dead. Mummification does not take place if the new-born be thrown into the water, nor does a mummified cord resume its original condition by being soaked. This fact is of importance, as showing whether a child was thrown into the water after an interval of several days, or soon after birth.

A sign which is absolutely indicative of live-birth, and that life has continued for a certain time, is the *line of demarcation* where the separation of the cord ultimately occurs. This line is generally marked about the third day, and is characterized by a red line of capillary congestion, by thickening and swelling and, commonly, by some purulent secretion. The cord usually falls off about the fifth day (limits about 2 to 15 days), cicatrization of the umbilicus beginning on the tenth day, and being complete about the twelfth.

Condition of the Abdominal Organs.—The presence of food or medicine in the stomach, unless placed there after death, proves that the child must have lived after birth.

The presence of air-bubbles *minutely* incorporated with the glairy mucus of the stomach, is strong proof of live-birth or at least of respiration, air which may have been introduced by artificial inflation not being mixed with the gastric mucus. If the child has been drowned or smothered, the contents of the stomach may render important evidence, as some of the liquid in which it was drowned, or substance (as meal or bran) in which it was smothered, may have been swallowed.

Though not absolute proof, the absence of meconium from the intestines is strong evidence that the child has lived, at least for some hours; the presence of large amounts in the colon and part of the small intestine, that if it lived at all, its life was short.

The presence of the golden-yellow streaks in the papillæ of the kidneys, caused by uric acid infarction, is thought by many to be proof positive that the child has lived; it must, at least, be considered a strong corroborative sign.

Length of Survival After Birth.—The signs here are so uncertain that medical evidence must necessarily be very guarded; great precision is, however, not usually demanded.

First twenty-four hours. Stomach contains a frothy fluid; clots found in vessels of cord; signs very uncertain.

Second twenty-four hours. Skin less red than during first day; meconium discharged, though there is still some greenish mucus in large intestine; contraction and thickening of coats of the umbilical arteries near umbilicus. Cord beginning to shrivel, but still soft and bluish.

Third twenty-four hours. Skin yellowish; epidermis begins to exfoliate; cord brown and drying; umbilical arteries contracted throughout the greater part of their extent.

Fourth twenty-four hours. Skin more yellow; epidermal desquamation on chest and abdomen; cord dry, inflamed ring, and slight purulent discharge at point of ultimate separation.

After fourth twenty-four hours. Cord usually falls on fifth day; ductus arteriosus closed on eighth to tenth day; cicatrization of umbilicus, tenth to twelfth day; umbilicus completely healed in third week.

Infanticide.

In cases of infanticide, medical evidence will usually be required to determine whether the alleged mother has been delivered of a child, and whether the signs of delivery agree, as to time, with the appearances presented by the child (see p. 1185); but the most important question will be, "*Was the death of the child due to natural or to other causes?*"

Natural Causes of Death in the New-born.—Death may arise from *congenital debility* in children born prematurely, or suffering from congenital disease, as syphilis or carcinoma; from various *diseased conditions* of the lungs, brain and cord, or abdominal organs; from *congenital malformations* of the large vessels or heart, or obstruction or atresia of the alimentary canal at some part, or from some marked defect in development[1]; from exhaustion from *protracted parturition*; from *natural suffocation*, from obstruction to the fetal circulation, by pressure on the cord in breech or footling cases, or in prolapse of the cord, or its being coiled about the neck of the fetus; from premature separation of the placenta; from contraction of the uterus about the neck or body of the child; or from its being born in intact membranes; from *hemorrhage* from various internal organs, from the genitals, or from the rectum, or less rarely from the cord, or from the umbilicus, after the separation of the funis. Fatal hemorrhage from the cord may occur, if it be not properly ligated after its division, or after its accidental rupture; it is more apt to occur when the cord is cut than when torn, when the cord is thick and gelatinous, rather than thin and small; the liability increasing the nearer

[1] Monstrosities are usually of feeble vitality and short lived. The [illegible] of such a [illegible] to the doctor, or other person, would render him liable [illegible]

the division is to the umbilicus, and diminishing after the pulmonary circulation has become established.

Accidental or Criminal Causes of Death in the New-born.—Cases of suspected infanticide always require most careful and searching investigation, both as regards the condition and actions of the mother, to whom the suspicion of guilt is, usually, most easily traced, and to the condition of the body of the infant, and the causes from which its death might have arisen. In addition to the facts learned from a careful post-mortem examination of the child, the physician may be required to testify as to whether the mother had sufficient strength, knowledge, presence of mind, or sanity to have prevented the death of the child by proper care. The law considers that no woman is competent to attend to her child at the time of confinement, and that, therefore, she should inform others of her pregnancy, and that any married woman knows what should be done for a new-born child. When, therefore, an accusation of child-murder is made, the defense that the woman did not know what ought to be done, or was faint or delirious, must be supplemented by further evidence that the woman was suddenly taken in labor while alone, and away from assistance. The opinion of the physician in these cases must be very guarded, and only expressed after careful and thorough investigation of the facts of the case; especially is this caution necessary when the woman is single, and the child illegitimate

Suffocation is a very common way of causing an infant's death, and may result from carelessness or criminal violence. In a child supposed to have died from this cause, we should carefully examine the mouth and trachea, externally and internally; internally for materials in which the child may have been suffocated, and externally for marks or even portions of a fabric that might have been held over the mouth for the purpose of excluding air, and for other marks indicative of compression by the fingers, always bearing in mind that the *apparent* is not always the *real* cause of death.

Strangulation may (as has been noted) occur *naturally*, from the coiling of the funis about the neck, or from criminal violence. The mark left by the natural twisting of the cord about the neck is broad, grooved, perfectly soft, and never excoriated, and the lungs will be found uninflated. Marks formed by the natural creases must not be confounded with those produced by strangulation. Where a child has been strangled after birth, the post-mortem appearances will uniformly be, congestion of the right heart, engorgement of the lungs, with punctiform and other *ecchymoses*, usually bright in color, on the pleuræ, pericardium, endocardium, peritonæum, and bronchial mucous membrane.

Drowning.—When a child has not breathed it is impossible to show that its death had resulted from drowning. If a child had swallowed dirty water containing shells, sea-weeds, sand, mud, diatoms, etc., it would be strong evidence that it had been placed in the water alive.

Wounds.—The presence of incised, lacerated, punctured, or contused wounds on the body of a child, is always suggestive of murder.

Fractures may occur from accidents, or a fall, or kick on the abdomen happening to the mother before the birth of the child, or from the child falling to the ground during an unexpected delivery; from the use of obstetrical instruments, or from criminal violence. It is well to note that fractures purposely inflicted are usually far more severe than any accidental injury, and are nearly always accompanied by other signs of violence.

Poisoning of infants is rare, except by the use of opium; death from *cold* and *exposure* usually occurs in the winter, and the evidence is mostly circumstantial; death from *starvation*—as a child will live two or three days without food—is almost invariably of set purpose; death from *burns* or scalds may be accidental or criminal, and here again the evidence must decide the fact.

Abortion.

In law, the term *abortion* is applied to the expulsion of the fœtus at any period of pregnancy.

The causes may be *natural* or *violent*. The *natural* causes (see page 561) may be internal disease, predisposition, moral shock, fevers, syphilis, or any cause which strongly affects the general or uterine system. Natural abortion is most frequent at a time which would have been a menstrual period.

The *violent* causes may be accidental or criminal, it being generally easy to distinguish between the two.

Criminal Abortion.—"A person who, with intent thereby to procure the miscarriage of a woman—unless the same is necessary to preserve the life of the woman, or of the child with which she is pregnant—either prescribes, supplies, or administers to a woman, whether pregnant or not, or advises or causes a woman to take, any medicine, drug, or substance, or uses or causes to be used any instrument or other means, is guilty of abortion."[1]

Criminal abortion, rarely attempted before the third month, and usually in the fourth or fifth, may be produced by mechanical or medicinal means, as very severe and prolonged exercise, jolting, blows, or any severe physical shock; by direct violence to the uterus itself, thrusting instruments into its cavity, cutting or tearing it; by rupturing the membranes, or by destroying the life of the child, thereby leading to its expulsion; by the use of almost any irritant drug in semi-poisonous doses.[2]

As these attempts are usually made by ignorant persons, the woman generally dies from metro-peritonitis, or other serious sequence. Death under these circumstances may be considered murder (usually manslaughter, first degree), though the accused did not intend to destroy life.

A medical witness should always state that all these methods of producing criminal abortion are uncertain in their operation, and always dangerous and often fatal to the mother.

[1] Penal code, New York, 1881, art. 291. [illegible]

Medico-legal examinations in cases of abortion, should be as follows (from Tidy):—

I. *Examination of the Mother, if Living.*

(*a*) Temperature.

(*b*) As to the woman's predisposition to abort, and the period at which abortion has commonly occurred.

(*c*) General state of health. Note existence of leucorrhœa, excessive menstruation, syphilis, asthma, malignant disease, uterine diseases, etc.

(*d*) Whether the woman be well or ill formed. Note pelvic malformations, effects of tight lacing, etc.

(*e*) Whether or not there be signs of recent delivery or of the expulsion of uterine contents.

(*f*) Whether any cause can be assigned to account for the abortion, *e.g.*, violent coughing, bloodletting, straining at stool, violent exercise, undue excitement, septic poisoning, violence, administration of medicines, etc.

(*g*) All injuries of the genital organs. Consider whether the injuries might not be self-inflicted.

II. *Examination of the Body of the Mother, if Dead.*

Take care not to mistake the effects of menstruation for those produced by abortion; to avoid injuring the parts by the knife or otherwise, during the autopsy, and to note the possibility of the injuries being self-inflicted.

(*a*) Note the existence of any marks of violence on the abdomen or other parts.

(*b*) The condition of the genital organs, noting all inflammations, rents, tears, perforations, etc. (If the uterus be injured, it should be preserved.)

Note also:—

1. The condition of the passages, relaxed or otherwise.
2. The condition of the os uteri—virginal or gaping, lacerated, etc.
3. Vaginal secretions, and if present, their character.
4. The general appearance of the breasts, presence of milk, etc.

(*c*) Whether there be any signs of irritant poisoning in the stomach, or of inflammation of the bladder, kidneys, rectum, etc. The contents of the stomach, if necessary, should be preserved.

(*d*) Whether the viscera generally indicate loss of blood during life.

III. *Examination of the Product of Conception.*

(*a*) Nature of the supposed product of conception.

(*b*) Consider whether there is evidence of a diseased condition of the membranes, or of the placenta.

(*c*) If a fœtus be found, determine whether it was born alive; its probable age, and the cause of its death.

(*d*) Determine whether, if there be wounds or other injuries, they were inflicted during life or after death.

IV. *Examination of all Drugs, Instruments, etc.*

Premature delivery may be induced by the physician "when the same is necessary to preserve the life of the woman, or of the child with which she is pregnant," the indications (see page 1002) for the procedure being rare at any time, and especially so before the period at which the child is viable.

Premature labor or abortion should never be induced without mature consideration, nor without consultation with a second physician, nor without full consent, in writing, if possible, of the husband or guardian; these precautions enabling the operator to prove, in case of difficulty, that there was a necessity for the operation, the life of the mother being in danger, and the operation less to be feared than natural labor, and that he had acted in good faith.

RAPE.

"The carnal knowledge of a female by force and against her will."

Carnal knowledge signifies *any* penetration of the male within the female organ, and need be only vulval, inflicting no injury on the hymen or other soft parts, and unaccompanied by the emission of spermatic fluid.

No matter what the age of the female, or whether she be chaste or unchaste, married or single, provided the carnal knowledge be against her will, it constitutes, in law, a rape, and is regarded as a felony; carnal knowledge of a girl under fourteen, whether with or without her consent, is rape, as is also, in most penal codes, carnality with the insane, with idiots, and with drugged persons.

In respect to all charges of rape, differences in strength, age, and development, must be carefully considered. A strong young woman can usually, provided she retains her senses, resist a man of ordinary power, and prevent the intromission of the male organ, while a very young or weak female could not prevent the consummation of the crime. Again, under threats of violence or death, fright may so paralyze the muscles of even a strong woman as to prevent effectual resistance, or syncope may be caused by fright or pain. Forced assent does not lessen the crime, *moral* force being, in the eye of the law, as much violence as physical force.

While sexual intercourse between an adult male and a very young immature girl is undoubtedly possible, it is, as a rule, only vulval, the hymen not being injured; when complete penetration does take place, serious injuries and lacerations are usual—on account of the narrowness of the vaginal orifice, the acuteness of the pubic arch and the deeply placed hymen—and death not rarely has resulted.

The presence of an *intact hymen*, if the aperture be *undilatable* and *small*, and the membrane itself normally placed, may be considered an almost *absolute* proof of virginity, more especially if other signs, such as a narrow and rugose state of the vagina, entirety of the fourchette and perineum, and

plump and elastic breasts, with but slightly developed nipples, are found; on the other hand, a dilatable or torn hymen cannot be considered proof of sexual connection, for its condition may be the result of accident, of congenital malformation, or of medical or surgical treatment. A freshly lacerated hymen may, however, constitute very important evidence in a trial for rape. Pregnancy may undoubtedly occur after rape, the same as after ordinary connection.

The examination in a case of supposed rape should be made as soon as possible after the commission of the crime, notes being taken upon all the points mentioned in the following schedule, which is taken from the admirable work of Tidy.

A. Examination of the Female.

I. Record—

(*a*) The date and hour when the female first made complaint, and the precise words employed by her at the time.

(*b*) The persons by whom she was accompanied.

(*c*) The general behavior of the female. Whether her statements were apparently made under compulsion or were in any measure dictated by those accompanying her.

(*d*) The general feeling of those accompanying the female, (1) toward herself, and (2) toward the accused.

(*e*) Any further remarks made by the female or her friends.

[If the medical jurist be directed to visit the female for purposes of examination, it is advisable that he should not give notice of the precise time of his intended visit, in order to avoid preparations being made for it.]

II. Enquire—

(*a*) The age of the female.

(*b*) The *date*, and *exact time*, when the rape was said to have been committed.

(*c*) The place where it occurred.

(*d*) Whether she uttered any cries, or was too terrified to do so.

(*e*) The exact circumstances under which the rape was committed; as, for example, whether the parties were standing or lying on the ground, etc.

(*f*) Whether or not the female was menstruating at the time.

(*g*) Whether she was sensible during the whole time that the offense was committed.

[Avoid all leading questions, especially in the case of children.]

III. Note—

(*a*) Whether the female exhibits any signs of narcotism, or of intoxication, or otherwise of drugging. This detail will be of no use unless the person be brought for examination immediately after the rape was committed.

(*b*) Whether the female walks as if in pain.

(*c*) Whether she appears of robust constitution, or whether there are signs of a low state of health, struma, etc.

(*d*) Whether she has the general appearance of a masturbate.

Having remarked on these points and made sufficient general inquiries, let the female be undressed. Institute a thorough investigation, with professional assistance, if possible.

IV. Examine the clothes worn at the time of the alleged rape. Preserve such portions as may be necessary for microscopic examination for—

(*a*) Blood.—Note if the stains are uniformly red, or marked by want of uniformity, suggestive of the admixture of blood with mucus.

(*b*) Semen.

(*c*) Other discharges.

(*d*) Mud, dirt, etc.

[Note if any of the clothes worn at the time of the alleged rape are torn, and, if so, the position of the rents. Record further if there are any indications of the clothes having been very recently washed.]

Note, with respect to *stains*—

1. That the presence of a blood stain does not prove connection against the consent of the female, nor that the injury, even supposing the blood to have come from the genitals, was the result of violence from intercourse. Such injury might arise from the introduction of a foreign body, or of the fingers, or be due to menstruation. The *absence* of blood, moreover, does not prove that the charge of forcible rape is untrue.

2. That the *presence* of a seminal stain on the garments of a female is strong presumptive evidence that a rape, or an attempt to rape, has been committed, although it in no respect fixes the crime on any one individual. The *absence* of seminal stains is no proof that the charge of rape is unfounded.

3. That with respect to stains arising from other discharges, it is practically impossible to differentiate the character of a discharge (*i. e.*, whether it be gonorrhœal, leucorrhœal, etc.), by the appearance of the stain.

4. That it is most important to compare mud stains that may be found on the clothes of the accuser with mud stains existing on the coat or trousers or other garments of the accused; and further to compare both with the earthy matter found at the precise spot where the assault was said to have been committed.

V. Whether the breasts are virginal, or show signs of having been manipulated, etc.

VI. Carefully examine and record all *general* injuries or marks of violence on the body of the female.

Note, with respect to such general injuries—

(*a*) Their character, size and exact position.

(*b*) Their probable age.

(*c*) How far they coincide with the story told by the victim.

(*d*) Whether the injuries could have been self-inflicted.

(*e*) Whether they could have been inflicted by others for a malicious purpose.

[Marks of general violence constitute most important evidence. It should be carefully considered whether the marks of injuries correspond or not with the alleged cause.]

VII. Carefully examine and record the appearance in detail presented by the genital organs.

1.—*External Genitals.*

Note—

(*a*) The presence of swelling, redness, tenderness, bruises, wounds, lacerations, etc.

(*b*) Whether the vulva, or the hairs on the vulva, show any appearance of being massed or clotted. If this be the case, the hairs are to be cut off and preserved for microscopical examination.

(*c*) Whether any dried blood stains on the genitals be visible.

(*d*) Whether there is any external sore on the genitals.

(*e*) The probable date of the several injuries observed.

2.—*Internal Genitals.*

Note—

(*a*) Is the perinæum or fourchette lacerated?

(*b*) Is the hymen ruptured or inflamed?

(*c*) Are the caruncule apparent, and if so, what is their condition? (*i. e.* are they small and colorless, or large and inflamed?)

(*d*) Is the vagina narrow and rugose?

(*e*) Is there any sign of disease, such as noma, etc.?

(*f*) Are there any syphilitic sores?

(*g*) What is the probable date when the injuries noted on the female were inflicted?

If the existence of syphilis or gonorrhœa be indicated, inquire—

(*a*) All particulars as to time, date, etc.

(*b*) Whether the female has been exposed to the possibility of infection otherwise than by intercourse?

[If there be extreme tenderness and swelling, make as full an examination as possible at the time, postponing a more complete examination until the swelling has subsided.]

Supposing marks of violence are found on the genitals—

1. Consider whether such marks may result from masturbation, or be self-inflicted, or result from the introduction of foreign bodies, etc., or be inflicted by others for a malicious purpose.
2. That, given signs of non-virginity, intercourse is not necessarily established because marks of violence be present.
3. That, given marks of injury caused by intercourse, such intercourse may have been by consent.
4. As a rule, therefore, the medical jurist should content himself with merely stating the marks observed by him, without stating their cause.

Supposing no marks of violence are found on the genitals—

1 Consider whether the interval since the crime was said to have been committed is sufficient to explain the disappearance of such marks.

2. If the examination be conducted immediately after the crime was said to have been committed, and the victim be of tender years, the absence of all marks of genital injury is strong presumptive evidence that a rape has not been committed.

3. On the other hand, if the victim be accustomed to sexual intercourse, the absence of marks of injury on the genitals is no certain proof that a rape has not been committed.

VIII. Examine carefully any discharge from which the female is suffering, remarking its character (*i. e.*, whether it be thick or purulent), its quantity, its probable source, etc.

Enquire—

(*a*) Whether the female suffered from any discharge previously to the alleged rape having been committed, and

(*b*) If not, how soon afterwards did the discharge occur?

[Supposing a discharge to be present, the question will be all important whether the accused is suffering from gonorrhœa.] The medical jurist should not commit himself as to the exact nature of the discharge.

Post-mortem where death has occurred from rape.

1. Examine the body generally for injuries, bruises, fractures, etc.

2. Examine the mouth for foreign bodies.

3. Examine the genital organs.

With respect to injuries consider—

(*a*) Are they such as to indicate that a rape has been committed?

(*b*) Are they sufficient to have caused death?

(*c*) Might the injuries have been caused by malicious design after death?

4. Examine the vaginal secretions, the pubic hairs, the vulva, etc., for spermatozoa.

5. Are there any post-mortem appearances by which the death might be accounted for other than those resulting from rape?

B.—Examination of the Accused.

Note—

(*a*) His size, strength, and general development, in comparison with those of the accuser. Is he impotent or not?

(*b*) Marks of scratches, etc., on the face, hands, penis, and body generally

(*c*) The condition of the frenum, the presence of seminal fluid in the urethra, and of the smegma around the glans, etc.

(*d*) Rents in, or stains of blood, semen, mud, etc., on the clothes.

(*e*) Whether the marks on the accused correspond or not with those on the accuser.

(*f*) Whether the stains of mud or dirt, etc., on the clothes or boots of the

accused, correspond or not with what might have resulted from a struggle at the spot indicated by the accuser, or that where the alleged crime was committed.

(*g*) Whether the accused be suffering from gonorrhœa or syphilis. If he is not, and the accuser is, or if he is and his accuser is not, such evidence is most important.

C.—Examination of the Spot where the crime was said to have been perpetrated.

Note—

(*a*) Whether the ground shows any marks indicative of a struggle.

(*b*) Whether any articles of dress, jewelry, etc., can be found on the spot where the rape was alleged to have been committed, such as might lead to identification, or otherwise be important as evidence.

(*c*) Whether the character of the mud, or of other materials likely to cause marks upon the clothes—such as paint, tar, etc.—correspond with the marks actually found on the garments of the accuser or of the accused.

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